GAS

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DEC 28 1944

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IN THE MAKING

Modern Production Methods Assure Balance and Precision in EMCO METERS

EMCO Domestic Meters are assembled and proved under ideal manufacturing conditions. Large volume, standardized production makes possible the use of every modern device that will assure the ultimate in precision in both machining and assembly, as well as in testing. Especially designed tools, jigs, dies, gauges, and fixtures are held to rigid tolerances by Standards Control. Proving operations are conducted in the same air-conditioned room as assembly to eliminate volume errors.

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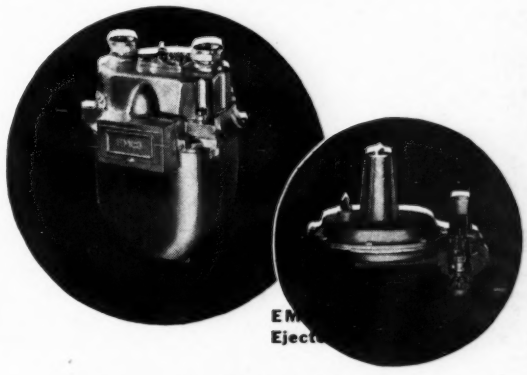
EMCO Small Meter Assembly Line

Overall view of EMCO progressive meter assembly line. Parts are stored in special trucks beside line. In center of picture may be seen moving belt which progresses to the far end of the room where proving operations are conducted.



EM... Ejecti...

PITTSBURGH EQUITABLE METER COMPANY

ATLANTA BOSTON BROOKLYN BUFFALO CHICAGO COLUMBIA HOUSTON

MERCO NORDSTROM VALVE COMPANY
Main Offices, Pittsburgh, Pa.
NATIONAL METER DIVISION, Brooklyn, N. Y.

KANSAS CITY LOS ANGELES NEW YORK PITTSBURGH SAN FRANCISCO SEATTLE TULSA

They go together like hand in glove

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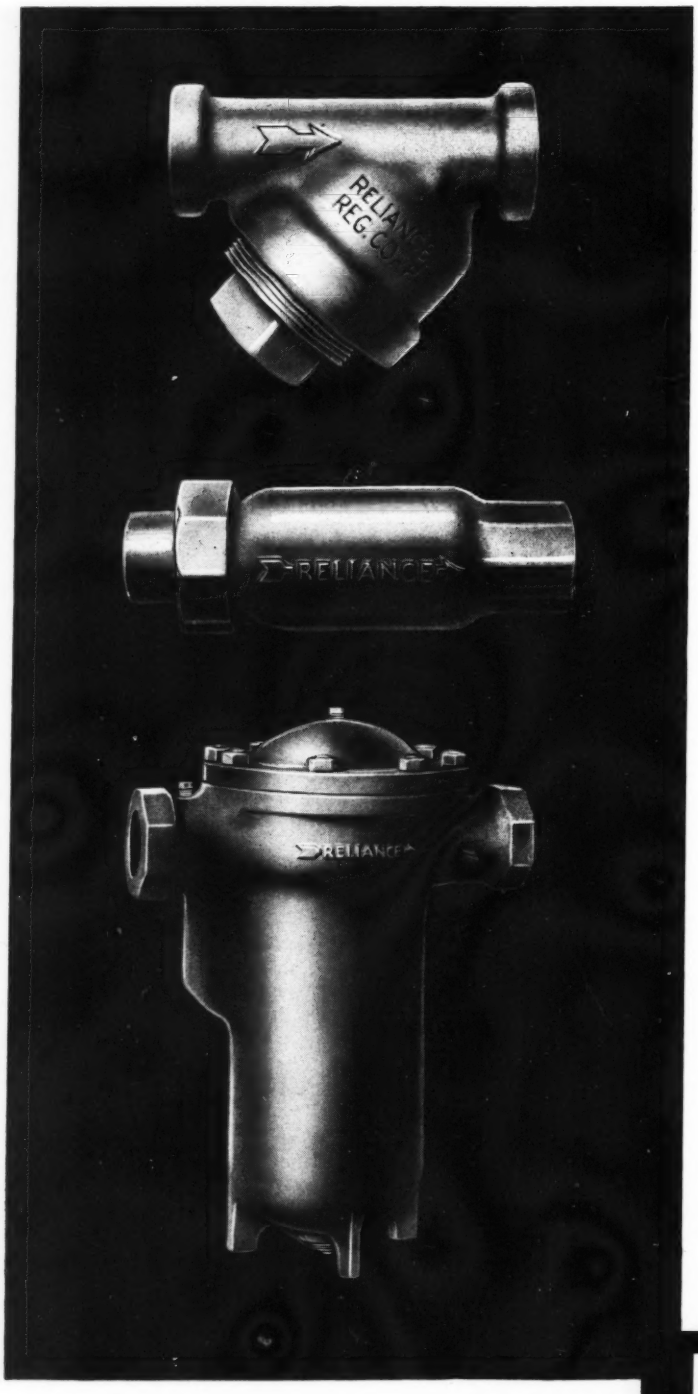
Reliance Filters

FOR HOME AND INDUSTRIAL USE



TYPE 'A' FILTER

This filter is used extensively with individual appliances such as water heaters, ranges, furnaces, etc., and is recommended for general use on house service lines in dust areas of the distribution system. Three sizes of elements for this type of filter are available, each with a different filtering area. Made with ¾" connection only.

TYPE 'B' FILTER

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TYPE 'C' FILTER

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Reliance Folder No. 35 gives complete specifications. We will be glad to mail a copy on request.

AMERICAN METERS

RELIANCE

AMERICAN METER CO. EST 1836

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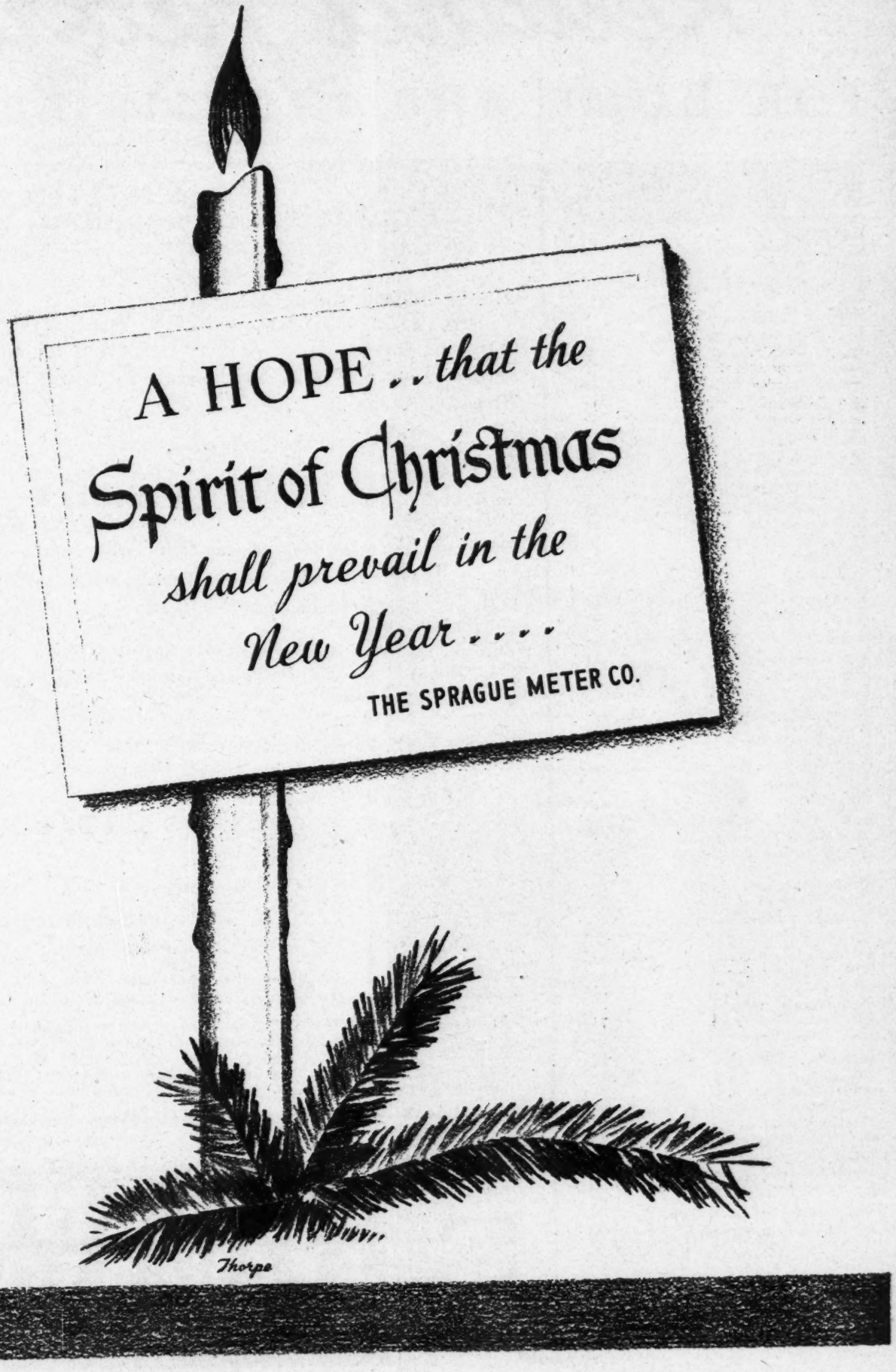
A HOPE .. that the
Spirit of Christmas
shall prevail in the
New Year ....
THE SPRAGUE METER CO.
Thorpe

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REG. U. S. PATENT OFFICE

Twentieth Year of Publication

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GUEST EDITORIAL

Our Laboratories Will Carry On

By R. M. CONNER

Director, American Gas Association Testing Laboratories

IN our hour of trial brought about by the great and recent Cleveland disaster nothing has been more heartening to us here than the expressions of good will and acts of thoughtful assistance that have come from friends everywhere.

From many people in many places, accumulating from far and near in numbers beyond conception, often renewing old ties and acquaintanceships long past, they have arrived as a pleasant surprise—an unlooked-for outgrowth of events, probably quite natural, but nevertheless unexpected and unanticipated by those of us thankful to be alive and busy with the pressing problems of immediate circumstances.

In themselves many of these individual expressions and acts may seem but small contributions. But accumulating day by day from more distant and surprising sources, becoming legion, they suddenly strike a conscious chord, the forcefulness and effect of which is like the sudden appearance of a guiding beacon in the darkness.

These are the little things of life—the things that dawn upon us with an impact counteracting original shock, awakening realization of their power, and yet things that really make life worthwhile, things that, as the minister would say, restoreth the soul. How much these expressions from friends of the gas industry at large have helped us to regain our composure, arrive at difficult decisions and carry on, cannot adequately be expressed. They can only be felt.

Within our own organization the heroic conduct of our staff, their unselfish devotion and high spirits have generated additional strength and faith. They are factors which in the end undoubtedly will make us stronger and bring about even greater future progress.

Not whole again as yet, we are nevertheless concerned with speeding that day when we shall be entirely rebuilt. Fortunate in our own escape at the Laboratories, we cannot help but think of those less fortunate who were our near and good friends. We shall never, for example, forget the helpfulness of Charlie Turner nor cease to feel his loss. To those who survived, we in turn offer our best wishes and assistance. We hope that we may help do for them what the friendliness of so many others has done for us.

Thermally Thinking

By ELLIOTT TAYLOR, Washington Editor

Hard Bargains

CONSERVATION and regulatory bodies of the various natural gas producing states have unofficial as well as official viewpoints that are widely divergent on matters of federal control, utilization of residue gas, extension of long distance transmission lines, and other questions affecting the present and future of the gas producing industry within their several jurisdictions. To a man, they are united on this one point, however, that most of the evils of natural gas wastage have been brought about not by indifference or by an anti-social outlook of some lease owners, but by the niggardly prices that are universally paid for gas at the wellhead.

Gas selling at ½c to 2c per M.c.f. in the field effectively invalidates all attempts at state enforcement of conservation measures, for the simple reason that ½c gas, or in many instances even 2c or 3c gas is simply not worth conserving. The resulting wastage of gas by flaring or blowing off has in large measure lent an air of reasonableness to the contention of the Federal Power Commission that only by regulation of the end uses to which transported gas may be put can the rapid exhaustion of our natural gas resources be prevented.

A measure introduced some years ago by a member of the Interstate Oil Compact Commission would have set a minimum price of 4c per thousand for gas in the field, and prohibited the sale of natural gas to pipe line or transmission companies below that figure. The resolution was not passed, but we believe that if such a measure can be embraced within the legal framework of the Interstate Oil Compact, it could well be introduced again, and supported by the natural gas industry.

The simple fact is that since the utilities are limited by law as to the returns that they are permitted to make there is little to justify such hard bargaining for gas in the field. Of far greater benefit to the public would be the conservation measures that fair prices would make possible, in comparison to the microscopic rate reductions that cheap gas makes possible.

Opposition to large scale gas transmission projects is now cropping up in every state where gas is produced in quantities. It is true that some of these states are of the naive and misguided notion that they can move Pittsburgh and Detroit and Cleveland to some new locations on the high ground in and around the Gulf of Mexico if they can only hold back on the gas that is now being exported to them. But even in the political window dressing scenes where the great heart of some ex-governor bleeds for his wasting natural resources, the story strikes popular response, not primarily because the gas is being exported, but because it is being exported so cheaply. The natural gas industry is going to need all of the friends that it can rally to its support before it is through with the Federal Power Commission's new determination to take jurisdiction over the end uses to which gas shall be put. Logical opponents of the invasion of states rights by Washington bureaucracy and therefore logical allies of the natural gas industry, are those state regulatory and conservation commissions who have heretofore had jurisdiction over the natural resources that lie within their states' boundaries.

But in all conscience, and in justice to the citizenry of their own states, these commissions cannot be expected to view with approval any new proposals to export gas at prices which they realize will only serve to make intra state conservation measures impractical if not indeed impossible. Powerless as they are to prohibit the sale of gas beyond the state lines, and powerless, too, to place any kind of embargo or export tax on such gas, it is at least understandable that they may look on Federal Power Commission intervention, in the ostensible interests of conservation, as the lesser of two evils.

It is our opinion that the two major pipe line projects only recently proposed—one into the north central states and the other to the Pacific coast will both enlist the support rather than the opposition of the states of their origin if the field prices are known in advance to be fair and equitable.

Close to Cooperation

WITH considerably more tenacity than brilliance, no doubt, we have been laboring the point lately that the wide gulf that imagination has dug between the activities of the gas utilities, selling piped gas, and the liquid gas distributors, selling butane and propane from tanks, is not a yawning chasm at all, but only a little puddle filled with minor differences and kept stirred up by the jealous irreconcilabilities of very small minds indeed.

We have held to the point that even though one kind of gas boils at freezing and the other at -250° F., these differences as far as the public is concerned are so academic as to be negligible. Nor is the gas user deeply impressed by the fact that the president of one gas company wears striped pants in the afternoon, and has white piping on his vest while the owner of another may ride out on the service truck and give his journeyman a hand with making an installation. It is only the service rendered that counts, and the service rendered by natural gas, manufactured gas or liquid gas is so similar that the layman regards it as identical.

And there is no mistake about another point of similarity: The one big formidable competitor of both industries, and the one that is going to run the pants off them unless they join together in a united front, is electricity. Not electricity for lighting lights or fanning the breeze—but electricity for cooking, water heating, space heat-

ing and refrigeration, every use of which is at the direct expense of gas.

Recent letters from members of both branches of the gas industry serve to confirm our belief that the community of interest existing between them is amply recognized, and that there only remain to be worked out ways and means of most effectively attacking their common problems.

Extracts from a recent letter received from one of the nation's outstanding distributors of liquid gas, indicate that on that side of the street the spirit of accord is ready to blossom upon the slightest encouragement:

> "There is no question in my mind that in order to make this industry grow and prosper, all gas companies must unite in a common front by pooling their resources in advertising and not looking upon each other as competitors or ignoring each other in the over-all picture. The electric industry is made up to thousands of little companies, but when John Q. Public thinks of electricity he does not worry whether it is the Central Power and Light or the General Electric Company that will serve him. Likewise we in the liquid gas industry should join hands with manufacturers of appliances, the natural gas companies and the manufactured gas companies.
>
> "I don't know how such a union should be accomplished but I am positive that the manufactured gas industry and the natural gas industry would derive considerable benefit from association with the liquefied petroleum gas industry. This has been forcefully brought to my attention in our city. Workers from other cities came here . . . and brought with them their ranges which were originally made to use natural or manufactured gas. They were all converted, at small cost, to use liquid gas. I have talked to some of these people personally and know when they go home they will take their stoves with them and have them changed back to use the gas for which they were originally built. These customers will not change to electricity but had they been unable to obtain gas for their ranges while here, they might have become users of the electric range, and be reluctant to take a financial loss by disposing of it.
>
> "What the gas industry needs is to hold its present customers and acquaint the buying public with the fact that gas is available everywhere and is the preferable fuel."

Expressing on the part of the gas utility industry, and more particularly the American Gas Association, a viewpoint that is conspicuously in accord with that of the propane distributor (whom we are confident he has never met), a publicity and promotion-minded manufactured gas man writes:

> "I think the idea of including the advantages of liquefied petroleum gas service in national advertising is a splendid one, and speaking as a member of the sub-committee on copy I would be only too pleased to vote for it. However, in fairness to this committee I think it should be remembered that they act under the direction of the board of directors of the (American Gas) Association.
>
> "It seems to me that the first step should be the acceptance into the A.G.A. of the liquefied petroleum gas companies. It is pretty hard to spend the contributing companies' money in departures from previous practice such as this, without the acceptance of the industry as represented by its trade association. In fact it seems to me that the regional associations such as Pacific Coast Gas Association, Mid-West Gas Association, Southern Gas Association and others might well start the ball rolling in this regard . . . Some urging by your publication might help."

Since the time to plan effective postwar promotion is growing short, and since the necessity for a joint campaign embracing natural, manufactured and liquefied petroleum gas is abundantly evident, we believe that the next step should be a meeting of representatives of the American Gas Association and the Liquefied Petroleum Gas Association. The only item needed on the agenda would be the formulation of a plan whereby these two organizations may proceed forthwith to operate in harmony, in close cooperation and in mutual support of every campaign that is undertaken to acquaint the public with the convenience, the necessity and the economy of gas fuel.

Campaign Ahead

LETTERS have gone out to the members of the Association of Gas Appliance and Equipment Manufacturers advising them severally of the amounts of their expected contributions to the American Gas Association's new million and a half dollar advertising and promotion plan. The total to be raised by the appliance and equipment group is set at $200,000 and to provide this sum it will be necessary for the members to pay in individual contributions of almost three times the amount of their 1943-44 membership dues in AGAEM.

This is a sizeable increase in dues, or what amounts to dues, for AGAEM members, but we believe that it is an expenditure that it would be wise for the companies to authorize at this time. We believe it is wise, not because we have any disposition to give in advance a blanket endorsement of the manner in which the money will be spent by the A.G.A., or because we believe that the utilities as such are better able to conceive and execute a campaign than are the manufacturers. We believe the plan should be supported in this its first year at least, because it is essential that the gas industry, from the manufacturers of equipment to the public utilities and the distributors of gas service learn anew the meaning of full and complete industry cooperation.

From the manufacture of innumerable lethal instruments related only to the destructive energy of war, manufacturers will soon be turning to the production of peacetime goods, and the distribution of these goods through channels of cooperation that wartime preoccupations have momentarily blocked.

The current effort of the A.G.A. can be regarded as the first effort within the industry to reopen the almost abandoned roads back to peace time production and distribution of consumer goods. Financed as it will be largely out of war time profits, the effort is deserving of immediate ratification by the appliance and equipment makers.

This Month and Next

- The recruiting and training of sales personnel is just about the industry's No. 1 problem, and that is why we are glad to present the suggestions offered by J. R. Guidroz on page 18.
- News about the manufacturers is on the uptrend. Dresser Industies, Inc. is about to purchase three more companies, all of them in the Los Angeles area. Highlights on the construction of A. O. Smith's Permaglas water heater are presented pictorially on Page 20. Henry Kaiser, we understand, has bought the patents to a dish washer which can be operated most economically on gas-heated water. He is looking for production facilities in non-labor shortage areas.
- Southern California Gas Co. has done some fine work in developing training courses for service men. Under the present plan of operation, the service men attend what is virtually an industrial school, learning in the class room the practical answers to problems met in the field. *GAS* expects to present a summary of Southern California's experience in this activity in the January issue.
- We had hoped that our series on radiant heating would be published before this, but somehow the paper shortage wins out. It's all set and ready to go, so industrial engineers should be on the watch for the January number.
- There are a number of other things on tap also: a series on the value of liquefied petroleum gases to the gas utilities; an article on Dehydration by E. G. Hammerschmidt; some notes on new postwar appliances by Frank Weiss; some observations on safe practices in making gas leak surveys by D. E. Herringshaw of Jackson, Mich.

NOTES ON GAS RESEARCH IN ENGLAND

DURING the year under review nearly all the research work has been carried out, as formerly, at Leeds University under the immediate direction of Dr. Dent and the general supervision of Professor Townend. Dr. Dent has paid special attention to gasification in oxygen and steam, hydrogenation under pressure and methane synthesis; Dr. Key to the influence of pressure on the steam/carbon reactions and the purification of gases from organic sulphur, and Mr. Wood to preliminary experiments on the purification of synthesis gas under pressure and the combustion characteristics of coal gas. The remainder of the staff have helped on all programs. A research assistant has been attached to Prof. Sir Alfred Egerton's team working on the production and use of liquid methane.

Complete Gasification

The systems of complete gasification which have been tried in this country have so far been associated with the production of gas of low calorific value. The obvious method of producing gas of the same order of calorific value as town gas is to use oxygen, and the possibility of introducing cheap oxygen into the processes of the gas industry has been discussed many times, particularly after the development by the Lurgi Gesellschaft für Wärmetechnik m.b.H. of a pressure generator to work on brown coal, using a steam-oxygen blast and pressures "of several atmospheres."

During 1937 the joint research committee decided to examine the possibility of gasifying British coals in the same way. The reactions in the lower half of the generator were studied first by obtaining data on the interaction between oxygen and steam and coke, between the limited ratios of H_2O/O_2=3.0 and 13.4. These experiments provided data regarding this reaction and the probable composition of the gas which would react in the upper part of the generator. Then, in order to study the reactions of the upper part of the generator without the limitation of having to carry out the first series of reactions at the same time, studies were made of the action of synthetic gas mixtures and of nitrogen and hydrogen upon coke and coal.

The results to date of this research may be summarised as follows:

1. Coals and semi-cokes can be converted to gaseous and liquid hydrocarbons by the action of hydrogen under pressure. The reaction is strongly exothermic for both coal and coke.

2. In case of coal the reaction, once initiated, travels rapidly through the coal, achieving carbonization at a very high rate. The yield of gaseous hydrocarbons exceeds 100 therms per ton (total gas 250 therms); liquid hydrocarbons are also obtained in high yield and are of a "primary" character. The coke is finely porous and highly reactive.

3. The process may be combined with others, for example, with one involving the production of hydrogen by the pressure gasification of coke, or part of it, with oxygen and steam in a Lurgi generator, or with a process of methane synthesis from gaseous mixtures containing hydrogen and carbon monoxide, or with a process involving the sale of the reactive coke and the production of the necessary hydrogen by the breakdown of part of the rich gas made. All these will be explored after the gasification of coal with hydrogen under pressure has been achieved on the 300 lb. scale.

Action of Steam and Carbon Dioxide on Carbon

In the course of a laboratory study of the reactions occurring during gasification under pressure, those of steam and carbon dioxide on coke have been the subject of close examination.

This work has shown that more than one factor is involved in the gasification of cokes in steam and carbon dioxide. It has also indicated how the constants governing the successive stages for any coke may be evaluated. A more extensive study might well give a better understanding of the differences between cokes and lead to new methods of obtaining cokes of very high or very low reactivity.

Herewith are excerpts from the report of Dr. J. G. King, director of the Institute of Gas Research Fellowship Board, on the research work carried out during the year 1942-43, as extracted from the Council's official annual report (Communication G.R.B.8).

Dr. King's report was published as a special supplement to the GAS TIMES of May 13, 1944. The GAS TIMES is published by Hallows & Slaighter, Ltd., 29 Grove Road, Leighton Buzzard, Beds., England.

Synthesis of Methane

Methane can be synthesised from a mixture of carbon monoxide and hydrogen using any of the known methane forming catalysts, particularly nickel and cobalt. The reaction begins at about 200° C. and is very active about 350° C., giving complete conversion of the carbon monoxide at a high space velocity of the order of 5,000.

The catalyst is, however, affected by the presence of sulphur and the reaction gases must be purified to less than 0·1 gr. of sulphur per 100 c. ft. Also, the reaction is strongly exothermic and special precautions are necessary to dissipate the heat of reaction so quickly that the catalyst temperature does not rise unduly. If it does, the catalyst rapidly loses activity by sintering and by carbon deposition brought about by the breakdown of carbon monoxide.

Control has not proved difficult in the laboratory, but a careful study of the mechanism of the reaction has been necessary, in order that the best choice of conditions shall be made for use with plant in which relatively large catalyst columns have to be controlled.

The investigations now in progress form part of the general program on gasification but have also special significance as follows:

1. They form part of one system for the treatment of coal with hydrogen under pressure wherein the hydrogen, which would contain some carbon monoxide, would be treated by catalysis to sythesise some methane before being used for the treatment of the coal, thereby reducing the amount necessary from the coal to give an average gas of the required calorific value. Synthesis of methane in this way has the advantage referred to later of being conducted under pressure whereby a high temperature can be used and the tendency towards sulphur poisoning reduced. Also the combination would allow of the full utilization of the exothermic heat of reaction in raising the steam necessary in the production of the process hydrogen.

2. They form a means of producing methane from coke (CO and H_2) which would be alternative to that of the gasification of coal with hydrogen under pressure. This would lead to greater control over coke production but would have an even greater importance if liquefaction of methane should become a commercial process.

3. Research work has not been limited to high pressures since a low pressure synthesis could have immediate application in the gas industry and since it was considered wise to explore a wide range of operating conditions.

Removal of Organic Sulphur Compounds from Coal Gas and Other Gases

The removal of organic sulphur compounds from synthesis gas mixtures is essential when using catalysts of the type required for the synthesis of methane, since these are rapidly poisoned by traces of sulphur compounds. Also, the removal of organic sulphur compounds from coal gas has become a matter of pressing importance.

Processes applied to town gas are of three types:

1. Drastic oil washing by which the organic sulphur content can be reduced to about 8 gr. per 100 cu. ft.
2. The sulphur is hydrogenated over a catalyst to hydrogen sulphide and removed by iron oxide in the usual way.
3. The sulphur is oxidized to sulphur dioxide over a catalyst by the introduction of a small amount of air or oxygen, and the SO_2 removed by washing with an alkaline solution.

Survey of Gas Quality

As a first step it was decided to explore the variations of "gas quality" which now exist in the industry in order to provide a factual background against which the performance of any appliance may be considered in the future. The existence of such knowledge will also clarify any discussion relative to the quality of the gas which may be produced by any new or modified process in which the Board may be interested. Further, there will be a reduction in the volume of any fundamental work to be carried out when this work can be started, because a closer definition of its limits will be possible.

At present the variations in gas composition are connected with different methods of preparation such as carbonisation in horizontal and continuous vertical retorts, the carburetting of water gas, and with the coals used. It was decided to cover as many of these variations as possible by arranging for a research chemist to visit a selected number of works and make observations of the "quality" of gas.

The Survey Program

All the properties which are considered even remotely to affect combustion and other characteristics will be observed, such as chemical composition, air requirement for combustion, calorific value, specific gravity, and behaviour in certain test burners.

One of these will be the aeration test burner, but the use of this will not be confined to mere observation of the A.T.B. number, i.e. the air shutter opening necessary to produce an inner cone of specified dimensions. Rather will it be regarded as a standard Bunsen burner of which the air shutter can be adjusted to definite values and the corresponding cone height and flame height observed over the widest range of working conditions of which the burner is capable. Observations will also be made of the behaviour of luminous burners of the rat tail and flat flame types. The systematic examination of gas appliances has been excluded from this preliminary survey, the object of which is to focus attention on the gas.

Sulphur Survey

While the survey of gas quality is in progress it is intended also to make a survey of the sulphur compounds in the various gas supplies. This will not be confined to the determination of the total sulphur content of each gas, but will embrace the determination of the proportions in which the principal types of sulphur compounds exist, notably mercaptans, thiophen, carbon disulphide and more volatile sulphur compounds.

Production of Liquid Methane

For several years past at the Imperial College a group of workers, under the direction of Prof. Sir Alfred Egerton, has been investigating the liquefaction of methane and its use as a fuel for internal combustion engines. The work was sponsored originally by the Department of Scientific and Industrial Research, and later by the Ministry of War Transport.

Gas refrigeration and liquefaction are of particular interest to the gas industry, because they provide a ready means of separating the constituents of coal gas. The progressive cooling of coal gas in a liquefying plant can produce three important results:

1. The removal of constituents normally removed in the industry by other means, e.g. benzole. At the same time water vapor and organic sulphur compounds would be removed entirely.
2. The removal of valuable constituents at present burned in appliances, e.g. ethylene and propylene.
3. The removal of part of the methane for storage as a liquid during the summer months, for use in enriching water gas at periods of high demand. This smoothing of the load on gasmaking plant throughout the year should be of the first importance economically. The evaporation of methane from store could be linked with the separation of oxygen from air, to be used for the continuous production of water gas or in processes of complete gasification. Another use for liquid methane might be in its transport from large gasmaking concerns to small local works, where it could be evaporated and supplied to the community, thereby avoiding the necessity for carbonizing plant which is inefficient because of its small size.

In addition there is a noteworthy advantage in the increased pressure which would be imparted to coal gas before admitting it to liquefaction plant, namely, the high efficiency at which washing processes would operate, as, for example, the scrubbing out of ammonia by water, or of H_2S by a suitable solvent. After passing through the plant, the gas could be maintained at pressure for long distance transmission or expanded to obtain the refrigeratory effect and the recovery of some of the work of compression. Preliminary calculations on the design of a suitable expansion turbine have already been made.

These points and others are being borne in mind in the preparation of alternative plant lay-outs, and it is intended eventually to consider a detailed account of each, with an estimate of capital and running costs.

The work on methane synthesis is particularly interesting in association with the liquefaction process since the synthesis gas would be of higher methane content (about 65%). The higher the percentage of methane the more economical is the liquefaction process. This aspect is also being considered.

While this work is going on, a systematic study is being made of the phase equilibria attained by typical coal gases, when subjected to varying degrees of refrigeration over a wide range of pressures. Research on heat transfer at low temperatures will shortly be commenced. Both these researches are directed toward obtaining data for the design of plant for liquefaction and separation.

Infra-Red Researches

The objects of the research work carried out on infra-red radiation during the year 1942-43 have been, in general, to establish the fundamental principles underlying radiant heating processes and, in particular, to examine how gas heated appliances may best be utilized for this purpose. Special importance attaches to the question of whether a radiating source operating at a medium temperature and having characteristics approaching those of a "black body," as in the gas heated panel radiator, is preferable in general to higher temperature sources (e.g. heating refractory materials by flame, as in the gas fire) which do not radiate fully over the complete infra-red wavelength range but exhibit "selective" char-

acteristics, the bulk of the emission being confined to relatively narrow bands of wavelengths. These problems, among others, are now being studied with the aid of the infra-red spectrometer.

Combustion Characteristics

The problem of combustion characteristics arises from the number of variable factors concerned with gas supplies throughout the country, in particular the variations in calorific value, chemical composition and attendant air requirement, gas pressure and specific gravity. All such factors make it difficult to predict the precise behaviour of an appliance on a particular supply.

Probably the most important factor is the variation of chemical composition. Efforts are being made to provide some means of over-all assessment of these characteristics, special mention attaching to the work of the joint research committee and at Watson House (Gas Light and Coke Company) with the aeration test burner, and also to the work of the South Metropolitan Gas Company on the graphical portrayal of the zones of stability within which any burner must function.

There has been a great need for more fundamental knowledge on such matters as the variation of ignition velocity with chemical composition of a supply and the actual physical characteristics of the phenomena of light back and blow off. An investigation has been made into the methods of measuring ignition velocity, which has led to its establishment as a physical constant, independent of all environmental factors except the working temperature and pressure. This result has been rendered possible by the careful measurement of inner cone areas, previous workers having calculated them on the assumption that they approximate to true cones.

This work has also led to an appreciation of the importance of the dead space between the head of the burner and the base of the flame in relation to both light back and blow off. Further, the view has been put forward that the limiting diameter for light back can be employed as a criterion of the light back susceptibility of any supply. This will be put to practical test as soon as opportunity avails.

The technique of shadow photography has been employed recently in order to ascertain how far the phenomena concerned are influenced by aerodynamic factors; in particular, new light has been thrown on the characteristics of gas flow from the burner head before ignition.

Refractory Insulating Materials

A study has been made of the burning out of a considerable range of combustible materials which are or could be used to develop porosity in clay refractories. Little difference in the ignition temperature was noted, nor was the porosity appreciably different when related to the volume of the combustible matter present in the unfired specimen. The type of combustible matter used, however, affected the cold crushing strength of the fired product.

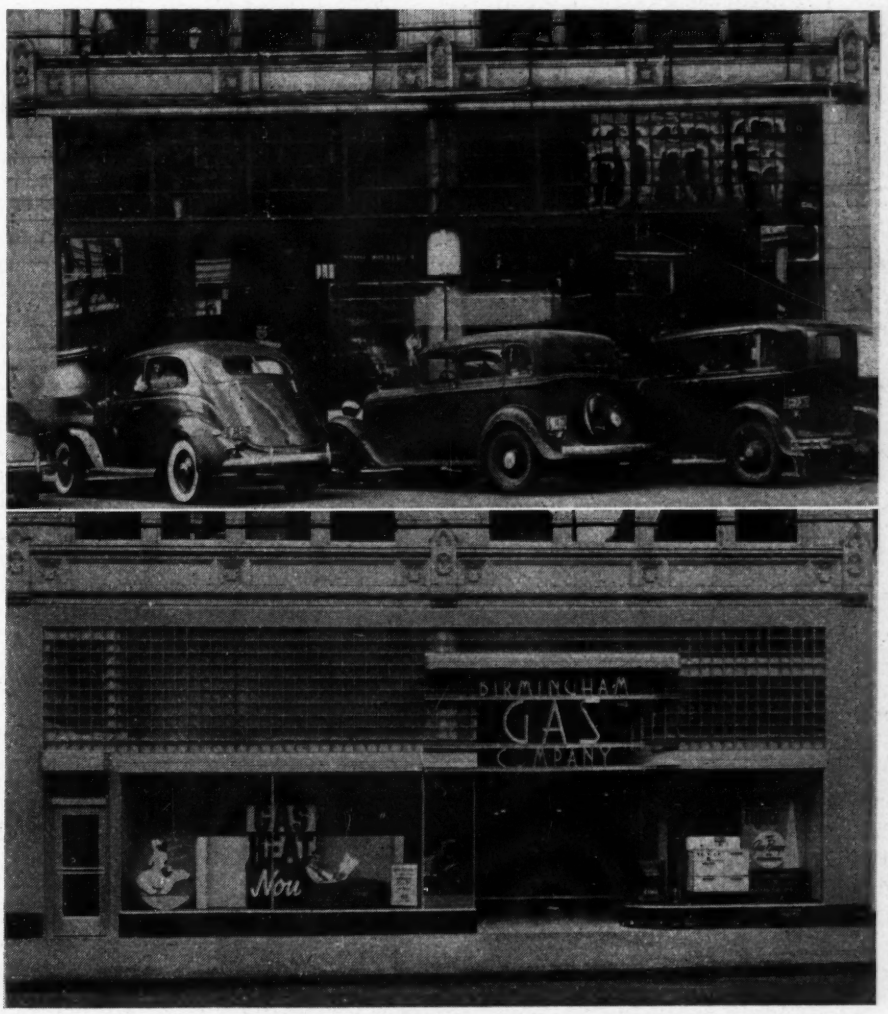
The effect of the pressure of overlying courses in causing deformation of insulating firebricks during firing has been examined experimentally, and it is concluded that squatting may be reduced by curtailing the period of soaking at the maximum temperature. The amount of deformation which can be tolerated must be weighed against the probable re-heat shrinkage.

Using the dry press method for making grogged clay insulating bricks, sample bricks of low bulk density coupled with adequate strength, spalling resistance and high temperature stability have been made. The porous grog for these bricks was obtained by firing finely ground fireclay and 16 mesh anthracite.

Modern methods of manufacturing refractory insulating bricks have been reviewed.

Work on the subject of refractory coating for insulating bricks has been continued, but whereas previous work was concerned with fired coatings, the present experiments have covered the spalling behaviour of unfired coatings. Some progress has been made in developing a chrome ore coating which is adherent and resistant to spalling.

A GAS COMPANY OFFICE HAS ITS FACE LIFTED



BEFORE AND AFTER: These photographs of the office of the Birmingham (Ala.) Gas Co. show what can be done to bring an outmoded structure up to date. The office was redesigned by architects Miller, Martin, and Lewis. Products of the Pittsburgh Plate Glass Co. used were glass block, Carrara structural glass, wine bulkhead, beige pilasters and facia, and polished plate glass.

Suggestions for Recruiting and Training

POSTWAR SALES PERSONNEL

By J. R. GUIDROZ

Industrial Engineering and Utilization Department, New Orleans Public Service, Inc.

EVERY one in the gas industry is vitally concerned with the future of the industry after the war. That future necessarily includes a successful selling effort, and those who have worked in the sales end realize only too well the necessity of *planning now* to recruit and train postwar salespeople in order to *be ready to do the job* when the time comes.

It cannot be assumed that at the end of the war we can immediately set up business at the old stand with our present sales personnel—if any—and expect to function on a prewar basis. But by looking ahead and facing the problems which are sure to beset our sales organizations, we can at least get a head start. And it is not too soon to begin planning.

The first step is to look around and take stock. It's no secret that the sales departments of most companies have been practically stripped of their personnel, so every sales manager faced with the task of rebuilding a sales organization is going to have to start with manpower. This brings up the question: *When? Who? How Many?* As time goes on it becomes more and more imperative that we find the answer to these questions, so *now* seems to be a good time to *make some decisions* about them.

Need for Good Men

One of the big problems is going to be *competition.* In the old days many of the best men in the community were attracted to the gas industry. Some will continue to come to us, but we will have to do some real selling to get as many good men and women as we will need. This competition will appear suddenly and strongly and will be keen not only in the gas industry but all over the land. Regardless of how stiff the competition we may run into, of prime importance, however, is the getting of the right type of people. Many factors will be involved, with emphasis placed on *compensation, employee benefits, working conditions,* and other such considerations.

When we try to determine how many new salespeople we are going to need, let's not be too cautious about the size of our organization. If, due to more rapid demobilization than we have estimated, we find that we have a surplus of manpower, our utility trained men and women can do double duty by being made available to gas appliance dealers as our dealer outlets increase and expand. Such people will help sell the dealers the utility viewpoint and make them valuable allies in our future efforts. At the same time we will be giving valuable help to our dealer friends. Some steps that can be taken now are outlined in Table 1.

Selecting the Best

The next question that arises is: *"How shall we select the best?"*

Aptitude tests are undoubtedly very effective when handled by an experienced person. When such experience is not available, such tests probably should be left alone, and the method successfully used by sales managers in the past should be followed. For example, in our company we use a written application form which gives us certain pertinent information about the applicant and his educational, family, and experience backgrounds. This application is taken, of course, by our Employment department.

If the application indicates that, in the opinion of the Employment manager, the applicant shows promise, he is sent to the Sales department to be interviewed by three persons in a supervisory capacity. One of the interviewers should always be the immediate supervisor who will have charge of and be responsible for the new man's field work. If all three interviewers agree, we can be pretty sure that the applicant will fit into our organization. Trained sales managers and supervisors, working as teams in this manner, can do a better job of selecting good men than any one interviewer.

The rest is up to supervision to make the most of the man's abilities.

Training Problems

Now let's begin to think about our training problems. We find immediately that we are confronted by *change.* People have changed. The fundamentals remain the same but our application of sales principles must be adapted to the changed conditions described below. There have been great shifts of population and other shifts will occur after the war. Since we sell to people, let's be sure to study our customers all over again.

Products will change as a result of the war, and as a result of changing desires and needs. Distribution methods may change. New gas appliance dealers and manufacturers will appear. These, and other changes, mean new approaches, new techniques, new material must be applied to training.

A common question is how will we recondition ex-service men to the normal world of buyer and seller? How will we help them readjust themselves to the relatively humdrum routine of the order book?

In this connection, an interesting article appeared in Life magazine, Oct. 4, 1943, entitled "It Makes Christians," by Capt. R. H. Chase.

TABLE 1. SECURING GOOD SALES PERSONNEL

What to Do	Where to Look
1. Develop in usable form a means of selling the advantages of lifetime work in the gas industry, with our particular company, and in our sales department. Do this aggressively.	1. Former sales employees now working in other departments and firms.
2. Use this material to retain existing personnel.	2. Other employees.
3. Make development of such material and a technique for presenting it to postwar applicants today's job so that it will be ready for operation upon instant notice.	3. Men and women released from the armed services (who may or may not want to return).
	4. The new group (men and women who have reached maturity since we cut our organization to meet war needs).
	5. All others (in particular, friends sent in by our sales personnel. Existing sales personnel can probably do a better selling job of their job than we can).

Chaplain U. S. Army. He says, "An Often Asked Question is, 'Does killing in war tend to destroy man's morals and finer sensibilities?' Upon questioning men in my regiment who have killed their enemies, I have discovered that they believe it will not transform them into gangsters, nor will it make any material difference in their actions. The majority think they will conduct themselves after the war much as they did before. Others are convinced they will lead better lives."

That's a very encouraging outlook. Nevertheless, much care and thought must be given to the training of sales people in their group, for it is only natural to suppose that their reaction will not immediately be exactly the same as those who have not been exposed to the abnormal conditions of combat experience.

The problem of making salesmen out of existing personnel is somewhat different. It will take less training to turn these men into productive salesmen once again, *but it will take training.*

The third task concerns the training of new people—men and women who have never worked in our industry or who have never worked at all. Most of our effort in the past has been devoted to training this third group, but our experience fits us for training the other groups as well.

Forming the Training Program

Several things, however, which should be done to make any training program successful, bear mentioning.

First of all, an effective training program must be based on predetermined training needs and on the specific selling requirements of each organization. It must be a coordinated plan for giving systematic, continuous training to all employees. It should be simple and effective, so that it can be put into use quickly and bring results. The dictionary states that training means "to give education by instruction and discipline." An even better definition adds that to train means "to form to a desired shape." Too many courses do an incomplete job by attempting to educate only. An adequate program must continuously form and mold the employee's activities, methods and attitude to the proper shape.

The *key* to *thorough sales training is skilled supervision.* A trained supervisor constantly analyzes the work and methods of his groups and continuously tries to improve the sales effectiveness of his men. The importance of holding good key men and, if we have been unable to hold these men, of keeping in touch with them and securing them as soon as possible at the war's end, cannot be emphasized too strongly. Without an efficient and enthusiastic supervisory group, all training and selling programs will fail.

The supervisor, too, must be trained. Some of his training will be forced upon him, for when he is given the responsibility of training and leading others he must study, think, analyze, and practice before he can teach. No matter how efficient he may be, however, he cannot be left entirely to his own resources. The sales manager must train his assistants constantly. Many of the same methods used for the salesmen can be applied to training the supervisor, but nothing can take the place of personal example by, and personal discussion with, the sales manager himself.

Discussions of sales problems with an explanation of the manager's method of analysis and his reasons for decisions will show the supervisor how to think and analyze. Interesting papers and clippings should be sent to him for study and comments. The same encouragement, confidence, and personal interest should be given him that he in turn gives his salesmen.

In training, as in selling, certain tools are required. The war has demonstrated the value of visual aids to teach a subject quickly and thoroughly. *This matter of developing visual aids can well be made a gas industry endeavor.*

Any program we set up for ourselves, however streamlined, will include the following:

1. A plan of training objectives.
2. A written sales program.
3. An outline of the minimum organization required and determination of the functions of such an organization which will be necessary before field activities can be started.
4. Organization of personnel who will do the training.
5. A retraining program for supervisors to bring them up to date in company policies, practices, objectives, functions, and in salesmanship and management of men.
6. Streamlined training to prepare the initial group.
7. A follow-up training program. This must be a continuous program with certain goals to be accomplished by stated intervals of time.

The program for sales personnel should be wide in its scope, covering:

1. The company.
2. The job, and its advantages.
3. Utility salesmanship.
4. Fundamentals of gas service.
5. Education in the functions of other departments.
6. Field training.
7. Special programs for gas dealers.

Much of our existing material will be found to need very little revision. It must be reviewed, however, and revisions made according to changed conditions. For example, since the Home Service group in our company is just about as large as it was before the war, and since there has been some turn-over of advisors, we are experimenting with this group and reteaching a course on fundamentals of gas, which was developed a couple of years ago for use with our outside sales representatives. Since we have the time, we are finding, by written tests, which portions of the course are difficult to absorb, and we are determining, by discussion, certain revisions that should be made to enable us to apply the course more effectively.

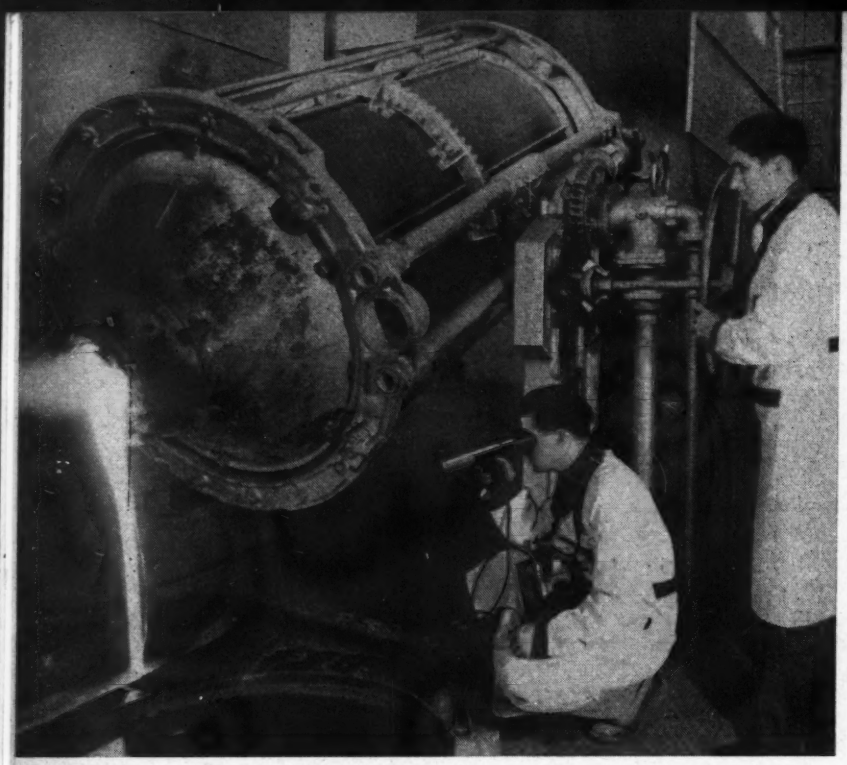
TEN THINGS TO DO NOW

1. Prepare sales presentation material for use in selling the postwar job we will have to offer.
2. Prepare and use material for selling former personnel on desirability of returning.
3. Prepare sales training material.
4. Try out newly prepared material in training present personnel.
5. Train present personnel in supervisory duties.
6. Teach key men techniques for postwar training.
7. Decide now on organization requirements for immediate postwar use.
8. Plan now for ultimate sales organization—size, kind, and functions.
9. Analyze and improve all procedures and practices.
10. Prepare sales campaigns for immediate use upon war's end in order to support the budget for an expanded sales personnel and in order to put new personnel to work in an organized and satisfactory manner quickly upon completion of training.

J. R. Guidroz

J. R. GUIDROZ has been a utility man for 12 years, most of that time on the sales front. At present, and for the duration, he is serving New Orleans Public Service as an industrial engineer. Prior to the war he had four years service as Residential Sales Manager. During the past four years he has been Regional Chairman for the CP Range Committee.

BUILDING A. O. SMITH'S *Permaglas* WATER HEATER



1. In a rotating smelter at 2300° F. the Permaglas mixture is liquefied, then poured into cold water, forming "frit," glass shattered into tiny particles.

2. Adherence of Permaglas on steel is seen in this microscopic view of a cross-section through a glass-lined specimen of steel.

3. Uniform, full-strength joints in the cylinder are produced by this Smith-developed flash-welder. Next the weld "flash" is trimmed off the joint.

SINCE 1874 A. O. Smith, Milwaukee Wis., has been making things out of steel. First it was parts for baby buggies, then stampings for bicycles. Next came the horseless carriage, for which Smith made the first pressed steel frame.

The came World War I, and the plant turned to welding bombs, A. O. Smith engineers contributing the first modern welding process and coated electrode. This new tool proved of great benefit to industries using pressure resistant containers.

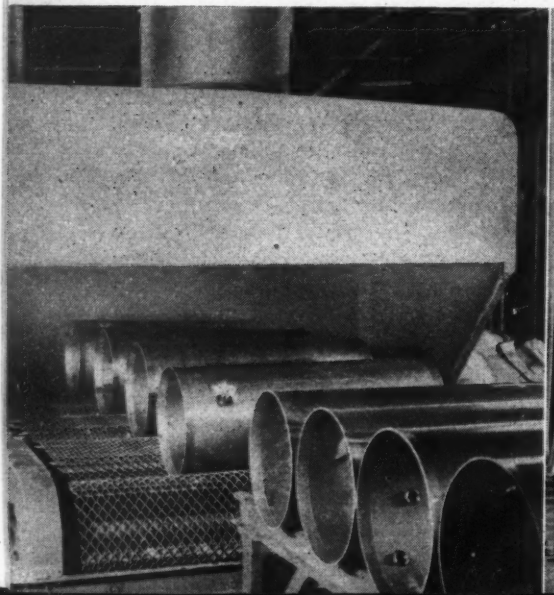
Then came the Permaglas formula—glass-fused-to-steel—evolved from experimentations which led to the ceramic coating of pipe to resist soil corrosion. Soon Smith was producing single-piece, glass lined tanks for food and beverage industries.

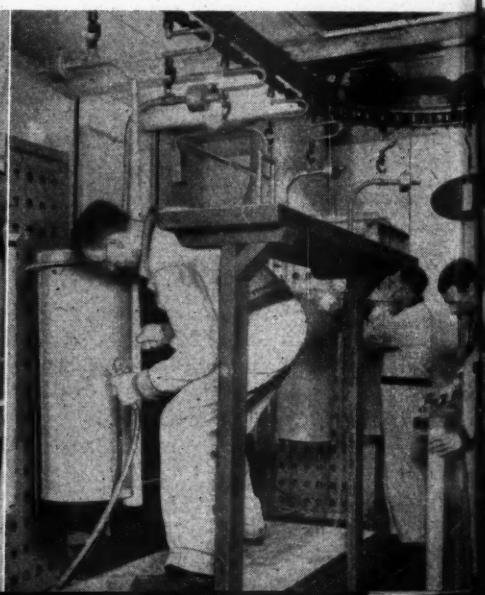
The next step was to make this sanitary, new, and different glass lining useful in the home. Backed by years of research and experience, a new design of water heater was evolved and tested. Over 75,000 were turned out the first year.

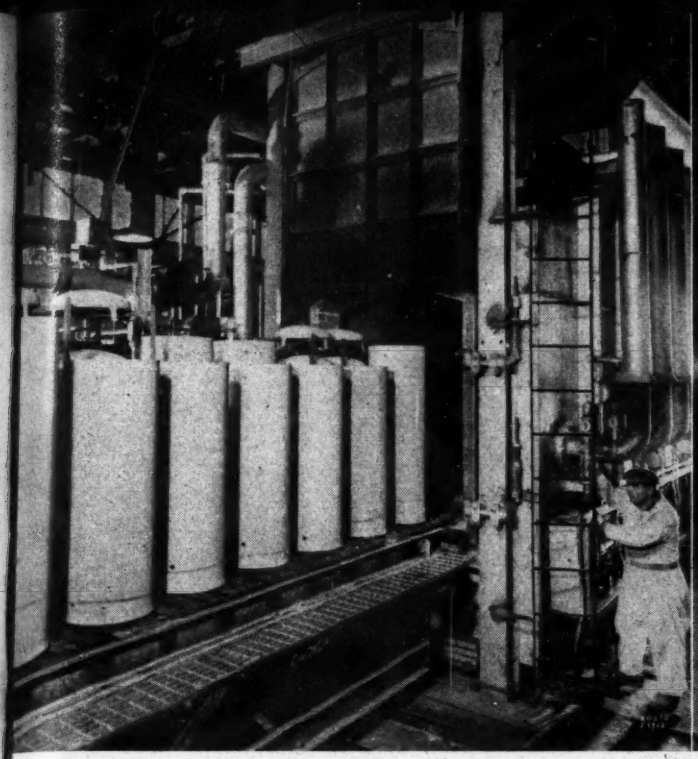
4. A hot alkali solution removes grease, dirt, and other foreign matter from the cylinders as they are fed continuously through the washing machine as shown below.

5. The Permaglas "slip" is applied by a special flooding method, as the parts, hanging from an overhead conveyor, move through the spray booth.

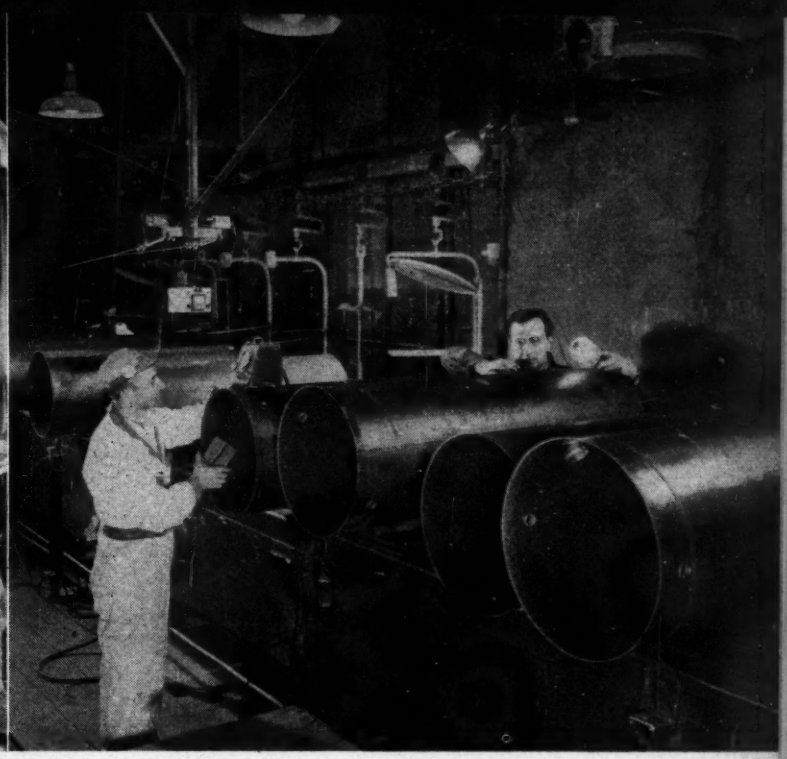
6. After drying comes the "brushing chamber." Running water on the floor carries away dust; an air conditioning system maintains clean, fresh air to protect the coated surfaces.







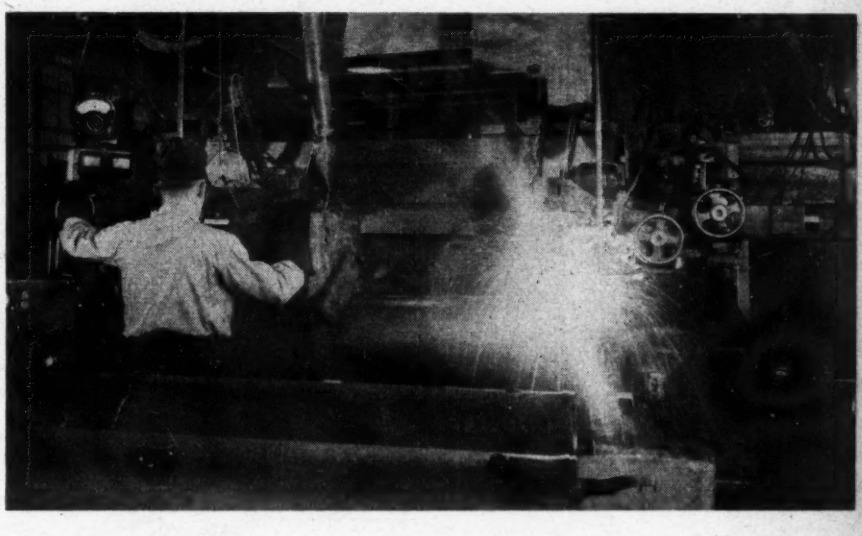
7. Now the various parts are loaded on the roller hearth of the furnace, unique because it is of the controlled oxidation type.



8. Emerging from the furnace, the glass-lined parts proceed down the inspection line for an electro-magnetic check-up of lined surfaces

9. Through the patented Monoquad assembly method, heads, shell and flue are joined by Smithwelding to make a complete tank.

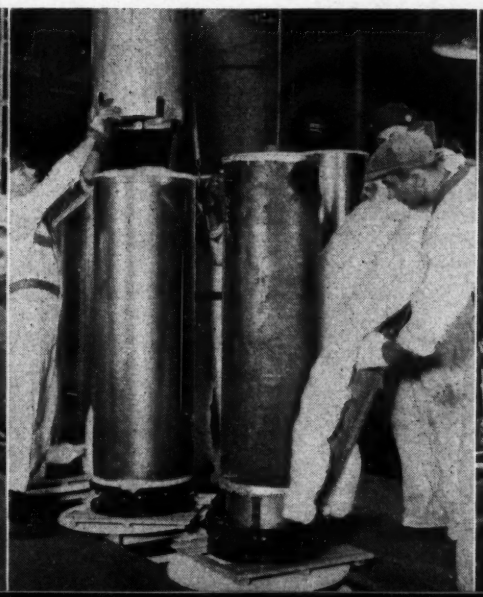
ermaglas is especially designed as lining on l, so that the two become practically insepar-. It has the ability to bend within the elastic t of steel, a brilliant, mirror-smooth surface, is blue in color. Throughout the manufactur- process it was particularly necessary to take y precaution in fabrication and inspection. he base material for glass-lining is called "frit," A. O. Smith makes its own. The scores of redients for Permaglas are gathered from far near; they are weighed up and mixed with oratory precision; huge smelters convert the to a clear liquid, which is poured into cold er. The sudden cooling turns the liquid glass tiny particles called "frit." These particles ground in a ball mill with special clays and water to obtain a semi-liquid called "slip," ch is suitable for application with a spray gun. hat is the substance which eventually becomes gleaming lining of a Permaglas water heater.

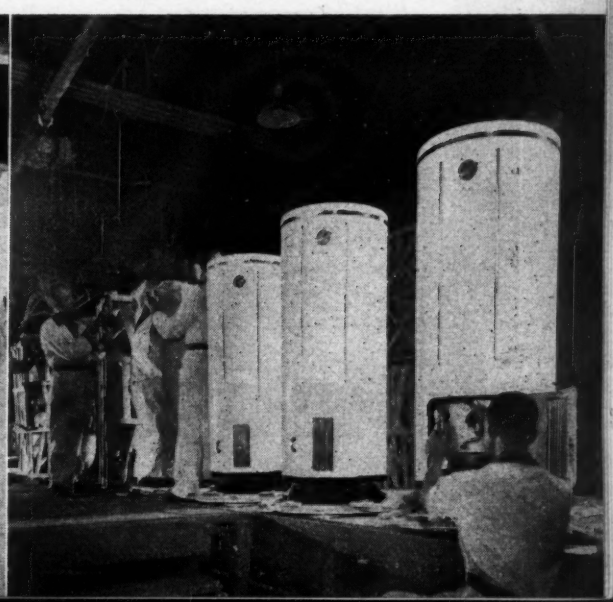


10. Each tank takes a high-pressure water test. At the same time it is inspected to insure against leaks or construction defects.

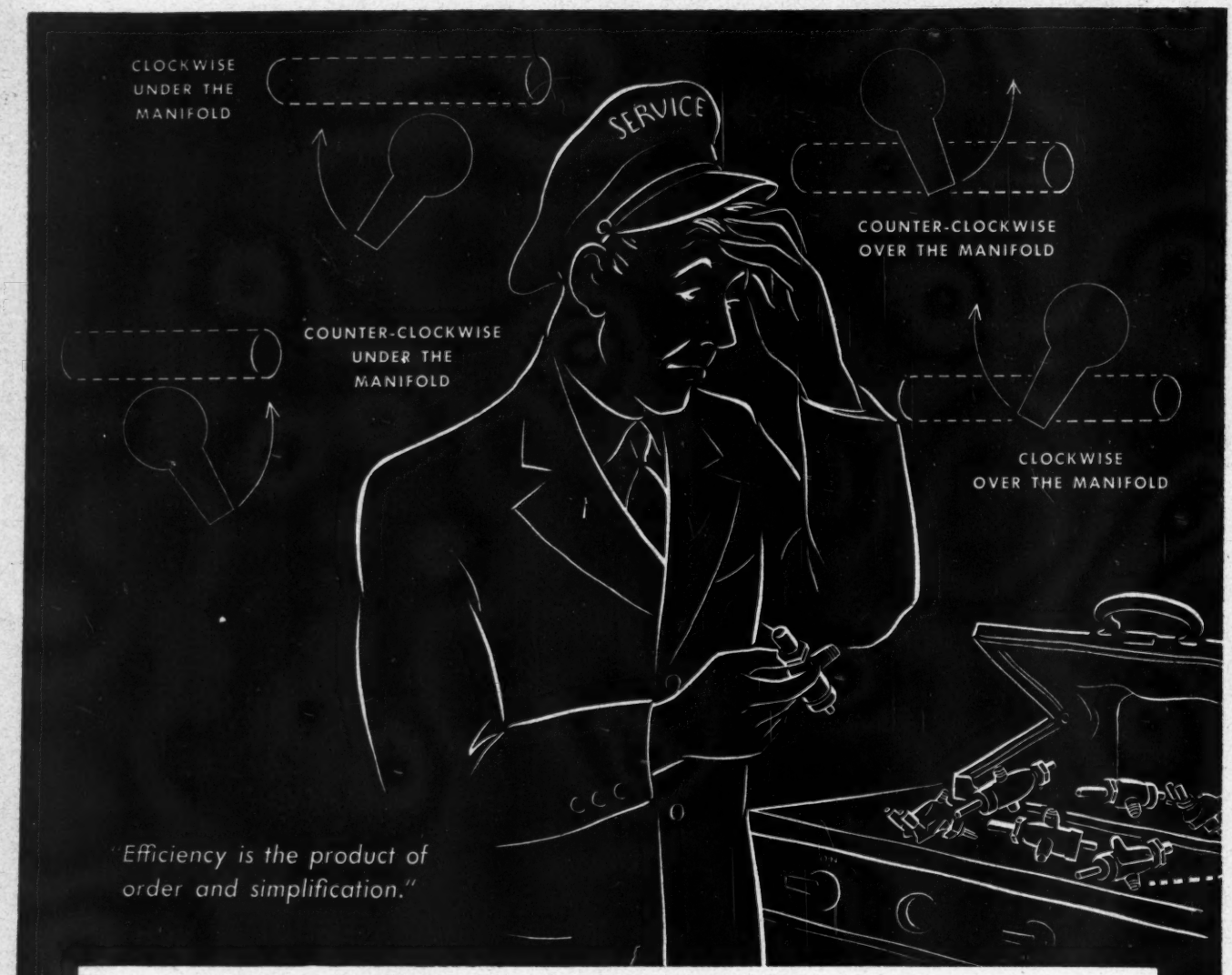
11. Finally, a snow-white blanket of "Fiberglas" insulation is packed around the water heater tank while the outer shell is slipped on.

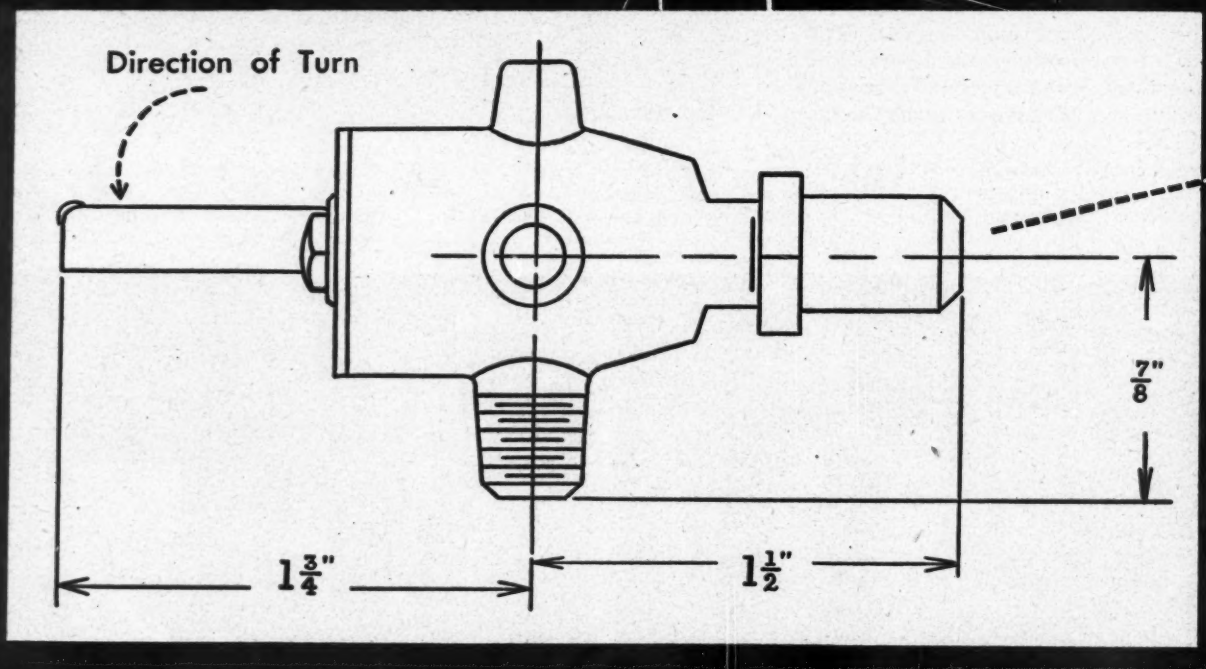
12. The conveyor keeps the water heaters moving through cooling room to final inspection and finishing touches. Without pause, each heater is set into its shipping carton and finally secured.





What will the gas range of





MODERN KITCHEN
Featured in
New Advertising Series

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A new series of consumer advertisements developed in accordance with recommendations of the Post-War Planning Committee will start in January, 1945 and continue for the next six months under sponsorship of A. G. A.'s Committee on National Advertising.

Specifically, the new advertising program will consist of two closely integrated campaigns. One will feature the latest developments and trends in the fast-developing art of kitchen planning. In this series the spotlight will be trained on the three essentials of a strictly modern post-war kitchen—a certified performance gas range, a gas refrigerator and ample hot water automatically supplied by gas heat. Insertions will occupy full pages, some in color and some in black and white.

The second campaign is specially designed to give separate featuring and stronger promotion to gas house heating and year-round air conditioning than is possible in the kitchen series. Half pages in black and white will be used. With one campaign supplementing the other, all five domestic utilizations of gas fuel will be given a strong play.

The column to be signed "Margaret Mallaby, American Gas Association Reporter"; will tell interesting and convincing facts about the many advantages of gas as well as developments in gas appliances to women in language women like—the intimate, editorial style of a woman writer. They begin with the January *Better Homes & Gardens* and February *American Home* and *Woman's Home Companion.* Circulation of these magazines is 8,430,716.

To answer inquiries created by the national advertising and to back up the A. G. A. national story, it is realized that a booklet is needed as a highly necessary step in a complete campaign of this nature. Preparations are now being made for the production of such a booklet which will incorporate colored illustrations of a number of strictly modern gas kitchens with text containing helpful suggestions on the planning of new kitchens.

More than just a beautiful kitchen!
You want a new type kitchen. Where everything is scientifically arranged to save time and steps . . . to give you a cool, clean, comfortable place for cooking good meals.
Your Dream . . . Our Scheme . . .
and LO! Tomorrow!
. . . is BIG! (The whole Gas industry is working on it!) It's a plan to bring you new freedom from wasted energy, wasted time . . . new freedom from fatigue, dirt, heat, unwanted kitchen odors. It's a plan to make your wonder workshop come to life!
Right now, we're working with kitchen cabinet makers and architects, Gas range and Gas refrigerator people, housewives and home economics experts — So that — shortly after V-Day — we'll be able to offer you dozens of ideas on new kitchens. Yes! direct help in getting the one you want — for new home or old — with the least possible effort and the lowest possible cost!
a new world of ease and convenience for every woman who cooks!
It's coming soon! . . . your "New Freedom Gas Kitchen"! * When? That depends on Victory . . . your war-work and War Bonds will speed it along. But you may be sure it will be economical and trouble-free in operation. For it will be built around these essentials of a truly modern kitchen . . . A CP GAS RANGE — with new features of fast, flexible, automatic cooking. CP means "Certified Performance" — your guide to the very finest in modern cooking appliances . . . A GAS REFRIGERATOR — silent, safe, trouble-free . . . OCEANS OF HOT WATER — automatically supplied by Gas for use in kitchen, baths and laundry. See your Gas company today!
CP
GAS
THE WONDER FLAME THAT COOLS AS WELL AS HEATS
AMERICAN GAS ASSOCIATION

The first campaign, full pages, some in color, some in black, to appear in eight magazines having a total circulation of 18,500,000 will turn the spotlight on the three essentials of a strictly modern postwar kitchen—a CP gas range, a gas refrigerator, and ample hot water automatically supplied by gas heat.

The decision to depart from the current series of two-color, full-page advertisements featuring "the house that gas runs" (a program, by the way, which enjoys high identification and readership ratings) came as the result of several weeks given over to an intensive study and analysis of various advertising themes, their timing and their promotional possibilities, together with increasing gas industry sentiment for the package-planned or coordinated gas kitchen.

It remained, however, for the Post-War Planning Committee to point the way. Two of its 31 recommendations constituted a special plea for the inauguration of the new advertising program, namely, "Advertising must concentrate on the use of gas in the kitchen" and "Support should be given to the recently announced coordinated gas kitchen equipment program."

Investigation also developed the fact that beautiful, glamorous gas kitchens are in growing demand among the women of America. Furthermore, it was agreed that the gas industry has a superior cooking appliance which, when properly installed, can excel all others in support of the "clean, cool, odorless kitchen."

With this background information at its disposal, the Sub-Committee on Approval of Domestic Gas Copy met at Cleveland, September 20 and 21, and went thoroughly into every phase

of the coordinated gas kitchen project as well as related activities. Reports were received from both technical and promotional experts and from chairmen of several special committees on the status of technical development of the ventilated kitchen, the coordinated kitchen without the ventilating feature and other pertinent matters.

With all the "evidence" in, the Committee spent the second day in executive session studying and analyzing four separate advertising campaigns presented by the agency, McCann-Erickson, Inc., of New York.

These four campaigns demonstrated the several ways in which either the coordinated gas kitchen, the ventilated gas kitchen, certified performance gas ranges or gas industry institutional objectives could be handled effectively in national advertising.

After discussing each campaign the Committee was of the opinion that since the coordinated gas kitchen project has reached an advanced stage of development and its promotion is an established commitment of the gas utility industry, the bulk of the national advertising scheduled for the first six months of 1945 should carry this story to the American public.

It was also felt that in addition to the enthusiastic reception given to the coordinated gas kitchen idea by a majority of gas utility companies, gas appliance manufacturers, makers of kitchen cabinets and other related items, there is a mounting flood of evidence that millions of Americans regard the kitchen as the most important room in their post-war new building and remodeling plans.

Announcement of a publication schedule for ensuing months awaits the completion of negotiations now under way with publishers. Plans are being made to run a series of full-page advertisements in "What's New in Home Economics", each advertisement to feature a large illustration of the kitchen shown in the national ads, together with a detailed explanation of all of the various features and innovations which are of special interest in the light of today's developments in kitchen planning.

It is contemplated that enlarged reproductions of the kitchen illustrations with accompanying factual explanations will be offered to teachers for classroom use. It is also thought likely that gas companies will find these enlarged reproductions of value in answering questions of customers relating to trends in kitchen modernization.

A full schedule of advertising will also run in Architectural Forum and American Builder & Building Age, commencing with the February, 1945 issues of those magazines. This advertising, at least in its early stages, will announce the availability of the Association's "Architects Manual of Modern Gas Service" and will contain basic material from that Manual. At the same time there will be some coordination in the copy treatment with the main themes of the kitchen advertisements.

As has been the practice of the Committee on National Advertising ever since the start of the national advertising movement nine years ago, local gas utilities will be offered newspaper mats of the advertisements. In the new campaign these will consist of reproductions of kitchen advertisements. As the new program develops, it is quite possible that other effective local tie-in features will be offered.

Initial insertion of the new national advertising program will appear in the following magazines having a total circulation in excess of ₹8,500,000 copies.

Issue		*Appearance Date*
January 20th	Saturday Evening Post	January 17th
January	Woman's Home Companion	December 19th
January	House & Garden	December 20th
February	Ladies' Home Journal	January 29th
February	House Beautiful	January 20th
February	True Story	January 15th
February	Parents Magazine	January 20th
February 12th	Life	February 9th

Better Homes & Gardens, January, 1945
American Home, February, 1945
What's new...
in the house that Gas runs!
BY MARGARET MALLABY
If you've ever had a dream about a "perfect" kitchen — prepare to see it realized. One of the biggest kitchen planning jobs ever launched is now under way. And as visualized by its originators — the Gas industry — it promises a whole new world of ease and convenience to every woman who cooks.
These new-type Gas kitchens will be work-saver kitchens . . . step-saver kitchens. And so beautiful you'll want to entertain in them. Virtually nothing that will add to your comfort, convenience or leisure will be left out. Everything that will make it economical and trouble-free in operation will be put in.
Years before the war the Gas industry's laboratories were doing all sorts of pioneer research work in Gas and Gas appliances. Naturally, the newest and latest developments have been "under wraps" during the war. But tomorrow — your "New Freedom" Gas kitchen will be built around these latest scientific marvels. Keep in touch with your local Gas company for the latest news on them!
Today, everybody you meet talks about heat — or the lack of it! Of course, if you're one of the fortunate folk who already heat with Gas — you're thoroughly relaxed about Winter and its biggest problem. Your Gas heating plant re-fuels itself . . . you don't have to order or store fuel . . . it meets weather changes automatically . . . and you bask in clean, comfortable, reliable heat all winter long . . . without the slightest fuss or bother.
Watch for the new Gas air-conditioning units. They're utterly simple and compact. With a single click of the regulator — they not only keep your house warm as toast in winter — but cool as a cucumber in summer. And — in perfect automatic fashion — provide you with healthful humidity control all year round.
One last word. Look into the matter of installing a new Gas water heater in your house. The post-war models are going to be better than ever . . . so reliable and so completely automatic you'll never have to worry about hot water. There'll even be enough on wash day!
Margaret Mallaby
American Gas Association reporter

The second campaign, consisting of half pages in black and white, will cover all five uses of gas. These ads will be in the form of a personal column of advice on the home—chummy chats to women, discussing homemaking problems and the way gas can help solve them. The column will be signed by Margaret Mallaby, American Gas Association Reporter.

Supreme Court To Review Panhandle Eastern Case

The Supreme Court has agreed to review a Federal Power Commission order requiring the Panhandle Eastern Pipe Line to reduce its interstate wholesale rates on natural gas. The commission acted on a complaint by the City of Detroit and Wayne County, Mich.

The commission's order allowed a 6½ per cent return on a rate base of $67,137,305. The company protested, among other things, that this base did not include the cost of properties under construction and said the resulting return was inadequate. The Eighth Federal Circuit Court upheld the commission order. (Dallas News, p. 4, sec. 1, Nov. 14)

Postwar Committee Issues Water Heater Report

A 51-page report, tabulating the results of the gas water heaters portion of the national survey now completed by the sub-committee on new and improved postwar gas appliances, was issued in October by A. M. Beebee, chairman, Post-War Planning Committee, American Gas Association.

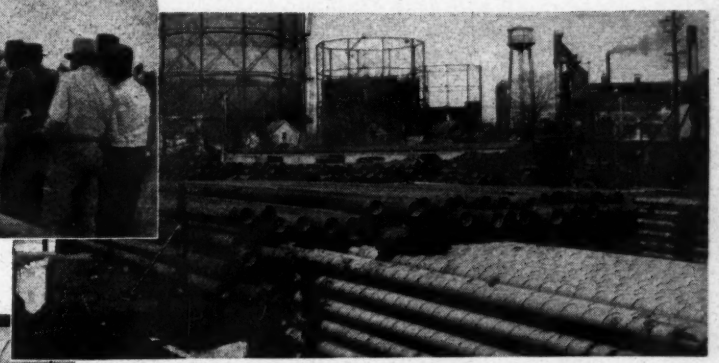
This report represents the summary of opinions of 128 gas companies on improvements most needed in postwar gas heaters and recommendations for developments of new gas water heaters to be sold by gas companies and appliance dealers during the postwar period.

from BATTLEFIELDS to Oil and Gas Fields again...

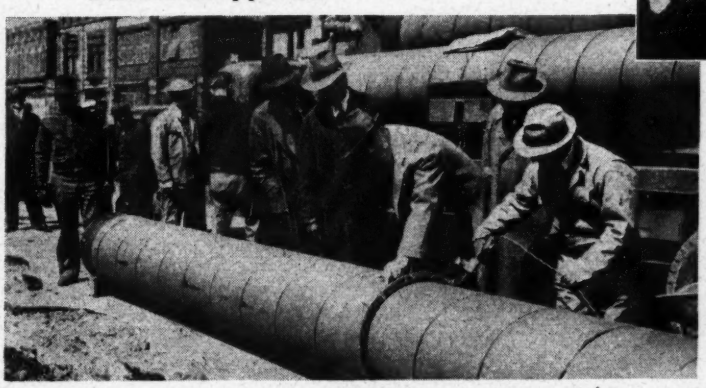
Performance of NO-OX-ID on pipe lines made it first choice as a rust preventive in military service. In the field of action, many new men have noted its exceptional performance under the most trying conditions. When these men take up peacetime occupations, they will recall many factory-new metal replacement parts which reached them in far away repair depots—parts that were corrosion-free—ready for instant duty because they were protected with NO-OX-ID, the *original* rust preventive.

When they apply their newly-gained knowledge at home, they'll see to it that pipe lines laid through corrosive soils are protected by coating them with NO-OX-ID and wrapping them with NO-OX-IDized Wrappers.

Coating and wrapping machines apply NO-OX-ID and NO-OX-IDized Wrapper to new transmission lines right out in the field where pipe is laid.



Gas holders are coated with NO-OX-ID, without pre-cleaning. Pipe, in foreground, has been doubly protected against moisture penetration and corrosion with NO-OX-ID and NO-OX-IDized Wrappers.



NO-OX-ID and NO-OX-IDized Wrapper protect pipe lines under city streets from untimely replacement due to rust and corrosion.

NO-OX-ID
IRON RUST
REG. TRADEMARK AUG. 27, 1918

The ORIGINAL RUST PREVENTIVE

Dearborn Chemical Company
Dept. B, 310 S. Michigan Ave., Chicago 4, Ill.
New York • Los Angeles • Toronto

A REVIEW OF THE IRON SPONGE PROCESS FOR

Removal of Hydrogen Sulphide from Gas

By C. GORDON MILBOURNE

Assistant Superintendent, Ugite Sales Corp., Chester, Pa.*

ONE of the greatest problems confronting the gas purification engineer today is that of increasing the hydrogen sulphide removal capacity of existing iron oxide boxes to meet present demands. This problem at the Southern California Gas Co. Butadiene Plant is serious because the purification system was designed to handle 38 million cu. ft. of gas per day with a maximum of 100 grains of hydrogen sulphide per 100 cu. ft.

The war time demand for butadiene called for production of 50 million cu. ft. of gas containing up to 500 grains per 100 cu. ft. One approach to the solution of this problem, both here and in the East, has been the introduction of more careful controls over operating conditions in the purifiers and the selection of a highly active purifying material.

The problem of hydrogen sulphide removal is particularly important where the gas is produced by the thermal cracking process for the manufacture of Butadiene since the hydrogen sulphide appears to accelerate the cross polymerization of such unsaturates as isoprene, piperylene, cyclopentadiene and butadiene. These compounds are present in relatively high concentration in this type of gas and form gums and granular deposits on the compressor valves, aftercoolers, the various absorption plant heat exchangers, and towers.

On two occasions at one Butadiene Plant in the East the hydrogen sulphide purifiers failed and four days later it was necessary to shut down due to the fouling of the compressor valves by these deposits. In other words, the presence of hydrogen sulphide appears to accelerate the formation of these resins about 50 times. These factors as well as the Railroad Commission limitation of 0.3 grains of hydrogen sulphide per 100 cu. ft. for distribution gas, makes it essential for the Butadiene Plant of the Southern California Gas Co. to maintain maximum efficiency of the iron sponge purification system.

There is a general tendency to consider the iron oxide purification process as a very simple operation. In reality there are many factors which play important roles in efficient and economical operation of this process.

From a practical standpoint the chief factors are:

1. Selection of the iron sponge material.
2. Methods of handling.
3. Methods of operation.

Methods of Manufacture

Under the selection of iron sponge material should be considered the methods of manufacture. These consist of the iron boring process, ferrous sulphate process, bauxite precipitate process, natural iron oxide and catalytic processes.

The iron boring process consists of the rusting of iron borings which are specially prepared for this purpose and then mixed with the fluffing material and layed in fields to promote oxidation.

The ferrous sulphate process consists of the precipitation of iron oxide by mixing ferrous sulphate and lime on the carrier.

The bauxite process materials are by-products obtained in the extraction of aluminum oxide ore and contain, beside the iron oxide, residual caustic and aluminum oxide. The only material of this type which was ever in general use came from Germany before the war.

Natural iron oxide such as bog ore are used principally in Canada where this material is found. These oxides usually have average capacity but have a low activity.

Catalytic processes using iron oxide have not yet come into general use. However, Leon Willien, who is now with the Institute of Gas Technology, reports that some work has been done at the institute in Chicago on a catalytic process based on the Fluid Catalyst principal, developed in recent years by the Petroleum Industry for the production of high octane gasoline.

The iron oxides from most of the processes are suspended on some fluffing material such as wood shavings, chips, or slag.

Wood shavings have the advantage of relatively low initial cost and high surface area per unit volume but tend to pack in the purifiers and break up in handling, causing high back pressure, particularly if the oxide is revivi-

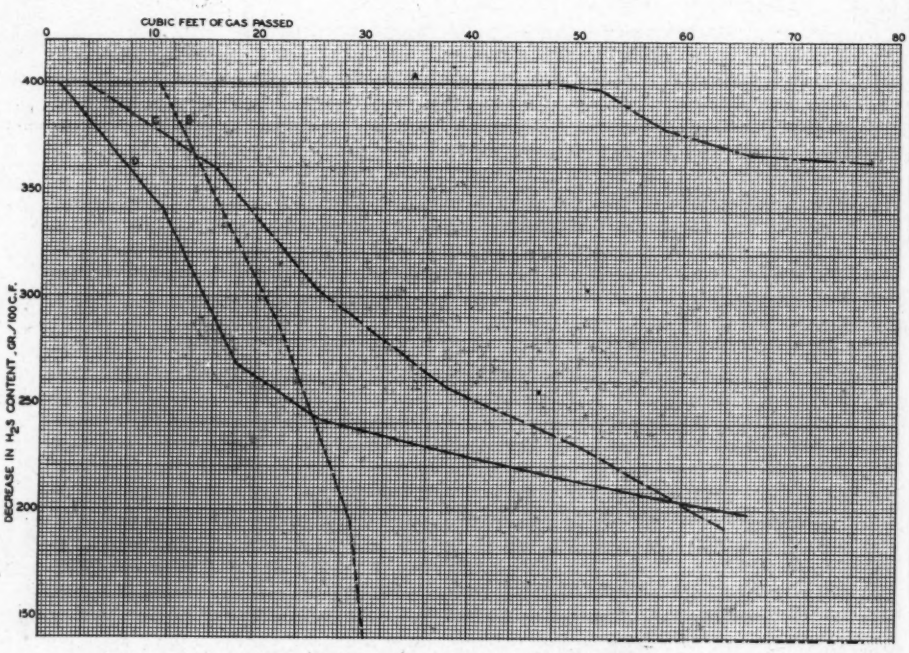


FIG. 1. Activity-capacity test data.

*Presented before the Pacific Coast Gas Association, Hotel Ambassador, Los Angeles, Calif., Sept. 14, 1944.

fied outside the boxes or is in use for long periods.

Wood chips have the advantage of reducing channelling and back pressure even after several handlings.

Blast furnace slag is used to some extent in the East because of low cost and the possibility of burning for sulphur recovery, but there is some tendency for this material to disintegrate and cause back pressure.

Iron Sponge Used at California Butadiene Plant

The iron sponge in use at the Southern California Gas Co. Butadiene Plant is made from half shavings and half chips. This mixture costs about 40% more than shavings alone.

In evaluating gas purifying materials, one of the common mistakes is the use of the percentage of ferric oxide (Fe_2O_3) as a major criterion of the value of the material. The fallacy of over-emphasis of this criterion is shown by the fact that some C. P. ferric oxide will not absorb any hydrogen sulphide whereas other material containing only 25% ferric oxide will absorb over four times its weight.

The curves (Fig. 1) showing a comparison of various oxides were obtained in the laboratory of the Southern California Gas Co. Curve A is for an oxide shavings mixture containing 7 lbs. of ferric oxide per bushel, for Curve B the mixture contained 6 lbs. per bushel, Curve C 4.5 lbs. and Curve D 11.0 lbs. It will be seen from these curves that the oxide having the lowest activity contained the highest weight of iron oxide per bushel.

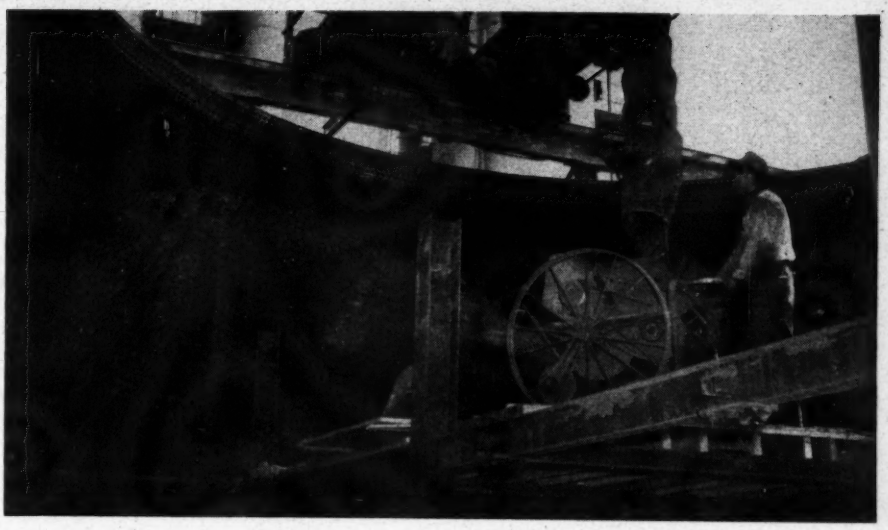


FIG. 3. High speed oxide distributor

The evaluation of a gas purifying material entails the accurate determination of its practical capacity and its activity. The test used to obtain the above curves is as follows:

A one liter sample of the material, just as received from the manufacturer, is carefully packed in a 3 in. diameter glass tube. A measured volume of oxygen free gas containing 400 grains of hydrogen sulphide per 100 cu. ft. is passed through this column. The rate of flow and the pressure drop are carefully controlled in order that all tests may be run under identical conditions. The gas leaving the test column is continuously exposed to moist lead acetate paper and the volume of gas passed before this paper shows a brown stain noted. As soon as hydrogen sulphide is thus detected, quantitative tests are begun and are made at regular intervals until no hydrogen sulphide is being removed. The length of time the material removes 100% of the hydrogen sulphide is taken as the activity, and the total hydrogen sulphide removed in two or three such tests indicates the capacity. Testing apparatus is shown in Fig. 2.

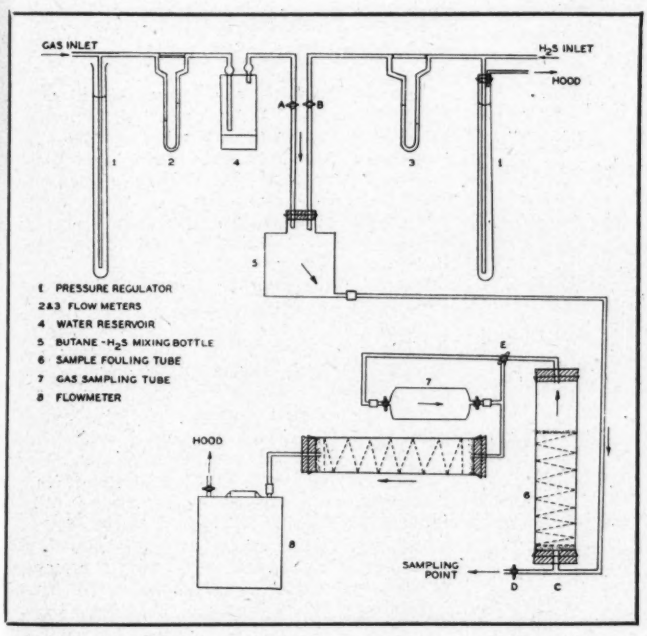


FIG. 2.

Activity capacity iron oxide sponge test apparatus.

Methods of Handling

In the loading of the iron oxide shavings mixture into the purifier boxes, conveyors or crane and clam shell bucket are used. At the Southern California Gas Co. where the boxes are 74 ft. in diameter a combination of conveyors and a high speed thrower is used.

This high speed belt thrower has reduced the time required and the labor costs of filling these large 50,000 bushel boxes by about two-thirds. It has the further advantages of more uniform distribution of the material and of increasing the capacity of boxes with overhanging tops by about 10% by facilitating the throwing of the material closer to the top. It is understood that such throwers have been in use for some time in the handling of grain. The thrower is shown in Fig. 3.

In the unloading of the boxes, air chisels and, at the Butadiene Plant here, a Victory Garden tractor tiller are used to loosen the material. Pitch forks are used to throw this material on to conveyors, wheelbarrows or directly into trucks. Some plants use clam shell buckets for this work also.

In connection with the unloading, too much emphasis cannot be placed on taking precautions against fire. In the case of a butadiene plant it is necessary, before opening the purifier, to insure the removal of any highly volatile hydrocarbon condensed

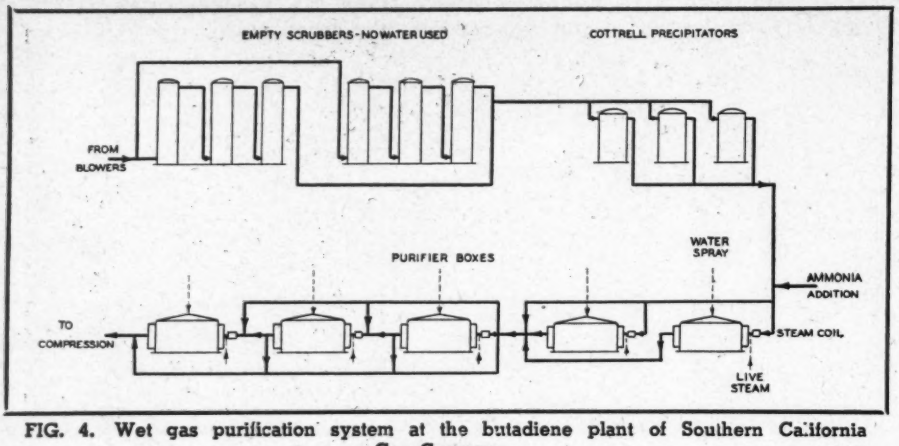


FIG. 4. Wet gas purification system at the butadiene plant of Southern California Gas Company.

in the oxide. This is accomplished by raising the temperature of the box to about 160° F with live steam while at the same time passing a slow stream of gas through the material. This procedure is continued until the oil portion of condensate coming from the box drops below 28° A. P. I. gravity. The box is then purged with products of combustion from a purging machine. After the box is opened the sulphided material must be kept thoroughly wetted down by means of water sprays. This is particularly important because a fire once started in this material is very difficult to extinguish.

Method of Operation

The removal of tar and oil fogs is essential in order to prevent contamination of the oxide surfaces. This may be accomplished by electrical precipitation (Cottrells), by mechanical tar extractors such as the Blaw Knox Vortex Scrubber and Tracifier, or the older type P and A Tar Extractor, or by wood shavings scrubbers. The Cottrells are very efficient and removal of 98% of the entrained oils is being obtained at the installation of the Southern California Gas Co.

In order to obtain maximum efficiency by partial revivification of the sulphide in place it is necessary that the oxygen content of gas entering the purifiers should be 0.4% plus 0.1% for each 125 grains of hydrogen sulphide per 100 cu. ft. At the Butadiene Plant a ratio flow controller is being installed to proportion the amount of oxygen injected into the gas.

This revivifying or oxidizing reaction is very markedly affected by the humidity of the gas. With humidities of 95% to 100% this reaction proceeds to completion in five minutes, whereas, other conditions being the same at 20% humidity, about 6000 hours are required. Therefore, the control of the humidity of the gas entering and leaving the oxide box is very important. In order to obtain this control and to maintain the optimum moisture content of 30% to 50% in the iron oxide, it is necessary to inject water into the inlet gas by means of sprays, or as steam. This may be supplemented by water sprays in the top of the box. The moisture content of the oxide can be followed to some extent by daily measurement of the quantity of drips coming out of the bottom of the box.

The use of water or steam for humidity and oxide moisture control also ties in with the control of optimum purifier temperature. This temperature should be maintained between 85° F and 100° F. Consequently, it is necessary, in most plants, to supplement open steam heating with heater coils ahead of the boxes. Even more important than temperature control, these facilities insure the maintenance of a positive temperature gradient across the purifier system and thus reduce the tendency of the material to become fouled by condensed oils and tars or by the deposition of excessive moisture.

Another important variable to control is the acidity of the oxide. This control is necessary in order to insure the formation of the active form of iron sulphide. While the various authorities disagree as to what the actual compositions of the sulphides found in practice are, plant experience proves that the sulphide formed under alkaline conditions is readily revivified whereas that formed under acid is not.

E. J. Murphy of the Brooklyn Union Gas Co. estimates an increase of 28% in sulphur removal can be obtained by injecting ammonia (2-6 grains per 100 cu. ft.) into the inlet gas. The work of Murphy indicates that optimum results are obtained by maintaining a Ph in the drips from the box between 7.0 and 9.0. A diagram of the plant is shown in Fig. 4.

The possible benefits of the above controls have been clearly demonstrated at one plant in the East where the oxide capacity was limited. In this plant the length of service per box has been increased from about 3 months to 12 months by exercising the above controls.

I wash to acknowledge the assistance of A. W. Ayers, P. C. Joy, and J. S. Powell of the Southern California Gas Co. in the preparation of this paper.

Oklahoma's Natural Gas Valued at $30,000,000

Extensive mineral resources of Oklahoma had a cash value of $253,284,000 in 1943, a survey by the U. S. Bureau of Mines and the Oklahoma Geological Survey, reveals.

The Geological Survey, Robert H. Dott, Norman, Okla., director, in cooperation with the University of Oklahoma and the Oklahoma Planning and Resources Board, has issued a map showing location of 20 minerals of Oklahoma and giving pertinent information as to each.

The "key" to natural gas shows average annual production for the past five years of about 260 billion cu. ft, valued at approximately $30,000,000. The average annual amount of natural gasoline extracted from Oklahoma natural gas for the past five years has been 432,000,000 gallons valued at $15,000,000. This does not include large volumes of liquefied petroleum gases, such as butane, propane and pentane. Production in 1941 of LP-gases in Oklahoma was given by the survey map at 91,136,000 gallons, valued at $2,076,000.

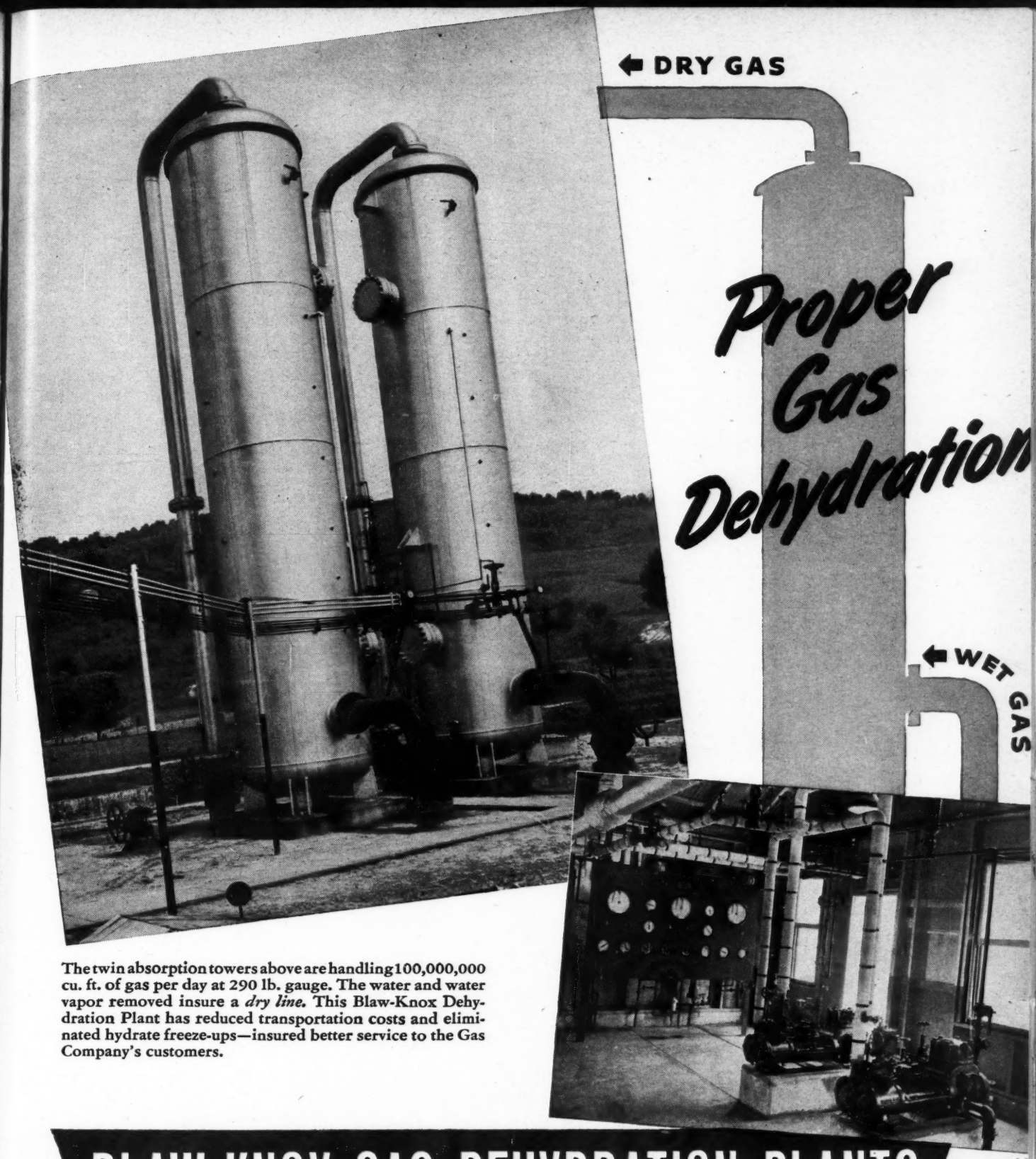
Referring to petroleum the map gives Oklahoma's proved oil reserves as 953,000,000 barrels (December, 1943 figures). Average annual production in the state during recent years was 175,000,000 barrels, valued at $200,000,000.

United Fuel to Eliminate $42,000,000 in Write-Ups

The Federal Power Commission announced Nov. 13 its order approving proposals by United Fuel Gas Co. to eliminate from its gas plant accounts amounts totaling $41,825,647.79 representing write-ups, excess of book cost over actual legitimate cost of properties acquired from affiliates, and other inflationary items.

The dispositions are to be effected principally through charges to capital surplus and to the reserve for depletion which, as carried on the company's books, includes $8,890,224.74 representing provisions made from capital surplus and earned surplus for the purpose of retiring an appraisal write-up of the company's gas leaseholds.

The original cost of United Fuel Gas Company's gas plant as of January 1, 1939 was reported to be $48,463,184.10. Thus the elimination of $41,825,647.79 represents about 86 percent in excess of the reported original cost of the company's gas plant.



The twin absorption towers above are handling 100,000,000 cu. ft. of gas per day at 290 lb. gauge. The water and water vapor removed insure a *dry line.* This Blaw-Knox Dehydration Plant has reduced transportation costs and eliminated hydrate freeze-ups—insured better service to the Gas Company's customers.

BLAW-KNOX GAS DEHYDRATION PLANTS

Blaw-Knox Gas Dehydration Plants are complete and thorough in design—adapted by experience to the buyer's needs. Blaw-Knox designs show progressive but conservative engineering directed toward *ease of operation; certainty of operating results over years of service;* and the best results per dollar invested.

We will be glad to furnish interesting performance data on these efficient plants.

BLAW-KNOX DIVISION OF BLAW-KNOX CO.
2033 FARMERS BANK BUILDING, PITTSBURGH, PA.
NEW YORK CHICAGO PHILADELPHIA BIRMINGHAM WASHINGTON
Representatives in Principal Cities

RESEARCH TESTS STEELS FOR PEACE IN THE CRUCIBLE OF WAR

In the train of vast tonnages and varieties of steel being produced in America for war, new and better steels for peace-time use will follow.

Because of the knowledge and experience gained through steel research and metallurgical development during the peaceful years, the steel industry was ready for war. It was prepared to produce quality steels quickly in overwhelming tonnages to help win the battle of supply and arm our forces with superior weapons and equipment.

The accelerated testing of steel in the crucible of war has enabled metallurgy and research to develop many tougher, better, more versatile steels that will open new avenues for enterprise and employment when peace comes.

JONES & LAUGHLIN STEEL CORPORATION J&L STEEL

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR

METALLURGY IN ACTION

How far will steel stretch and what "pull" can it take before it breaks in two, are facts important to quality control, quickly determinable by the tensile testing machine shown in illustration. Many other sensitive and intricate machines are employed today by the great force of trained steel research engineers and metallurgists in their work in laboratories and steel plants.

Better mortar due to metallurgist. The army had difficulties with field mortars, base couldn't stand the gaff, wore out before barrel. Young J&L metallurgist suggested trying special J&L-made armor plate for base. Ordnance worked it out. New base proved superior, even permitted greater powder charge, which lengthened mortar's range.

Miniature steel works, with small steel furnaces and rolling mills, is invaluable adjunct to department of research and metallurgy at J&L. In this pilot plant, first of its kind in steel industry, many important developments in steels were worked out before the war. Since the start of the war, a number of advancements in steel products were perfected here, put in production in J&L and other steel plants, contributed greatly to the arming and protecting of our fighting men.

Steel armor rolled on J&L strip mills, for tanks, guns, planes, after Army Ordnance proved it under fire, was developed (1942) in J&L pilot plant, from a peace-time formula of metallurgical research. The basic formula was one that J&L metallurgy had successfully worked out for oil country steel obliged to take severest punishment.

Metallography, or microscopic examination of steel, was developed by Sir Henry Clifton Sorby in 1849, is routine practice today.

Ginger snap micro-photo was submitted in jest to late Prof. Albert Sauveur (1863-1939), dean of American metallurgists, because structure of cookie resembled Sauveur's experimental photos of mild steel under microscope. Despite joshing, Sauveur persisted in development of science of metallography, now universally in use in steel research, and was awarded Bessemer medal of 1924. He held chair of metallurgy at Harvard.

De Re Metallica, first scientific treatise on mineralogy and metallurgy, 20 years in preparation, profusely illustrated with woodcuts, was written in Latin and published in early 16th century by Georgius Agricola, pen name for Georg Bauer, a Saxon. The work, translated into other languages, was text book for several centuries. Recent English translation (1912) was made by Herbert Clark Hoover and wife, the late Lou Henry Hoover.

"To arouse intelligent minds to action" was stated purpose of another pioneer scientific author, Vannoccio Biringuccio. His *Pirotechnia*, published 1540, treated of mineralogy and metallurgy and sold 30,000 copies, a medieval best seller.

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

4. Cathodic Protection, Theory and Research

Methods of Determining Effectiveness

R. B. MEARS, chief, chemical Metallurgy division, and R. H. Brown, Chemical Metallurgy division, Aluminum Research Laboratories, New Kensington, Pa. From a paper, "Methods of Determining Extent of Cathodic Protection," presented before the Fifth Annual U. S. Bureau of Standards, Soil Corrosion Conference, St. Louis, Mo.

THE prevention of corrosion by means of cathodic protection has been practiced for more than 100 years. In 1824 Sir Humphrey Davy [1] found that "small quantities of zinc placed in contact with the copper sheeting of ships will entirely prevent its corrosion." Since that time cathodic protection has been found to be one of the most economical and effective methods of preventing corrosion in many cases. Logan [2] stated in 1941 that cathodic protection was employed on 3000 miles of pipe line.

One of the difficulties in applying cathodic protection is to determine the current density needed to achieve complete protection. Some of the methods that have been used and some possible new methods will be described. The methods of determining completeness of protection may be classified as follows: (1) Visual, (2) Gravimetric, (3) Colorimetric, (4) Electrochemical.

Visual Examination: Occasionally it is possible to determine if the current is sufficient to prevent corrosion by observing the specimen after a period of exposure and determining if the specimen is attacked. Such a method usually is employed if the corrosion is severe or if it is localized. It is applied in cases where the equipment has corroded during operation and cathodic protection is applied in order to salvage the equipment [3]. It is also useful when cathodic protection is applied to stressed specimens [4] (Fig. 1—brass tubes). It has the disadvantage in some cases because appearances may be deceptive, especially if the material is unstressed or subject to intergranular corrosion.

Gravimetric: In the laboratory it is possible to compare the loss in weight of specimens exposed to the corroding environment with and without the application of a cathodic current. By employing different cathodic current densities, the value of current just sufficient to prevent corrosion can be established for the conditions of exposures.[5]

Under service conditions, test coupons closely bonded to the structure have been employed to some extent in the past. Weighed specimens of the same alloy which composed the structure it is desired to protect are bolted to various parts of the equipment at the time the current is applied. [6] After some period of time (which in many cases will be extended) the test coupons are removed, cleaned and weighed in order to determine the extent of corrosion at the various locations in the equipment for the value of current applied during the test. Conditions sometimes dictate the use of this method, but it is objectionable because it is time-consuming and cumbersome. Also, corrosion of valuable equipment to which the test coupons are bonded may occur, either because too high or too low current density was employed during the test. However, the method will probably continue to be used under certain operating conditions.

The minimum protective current re-

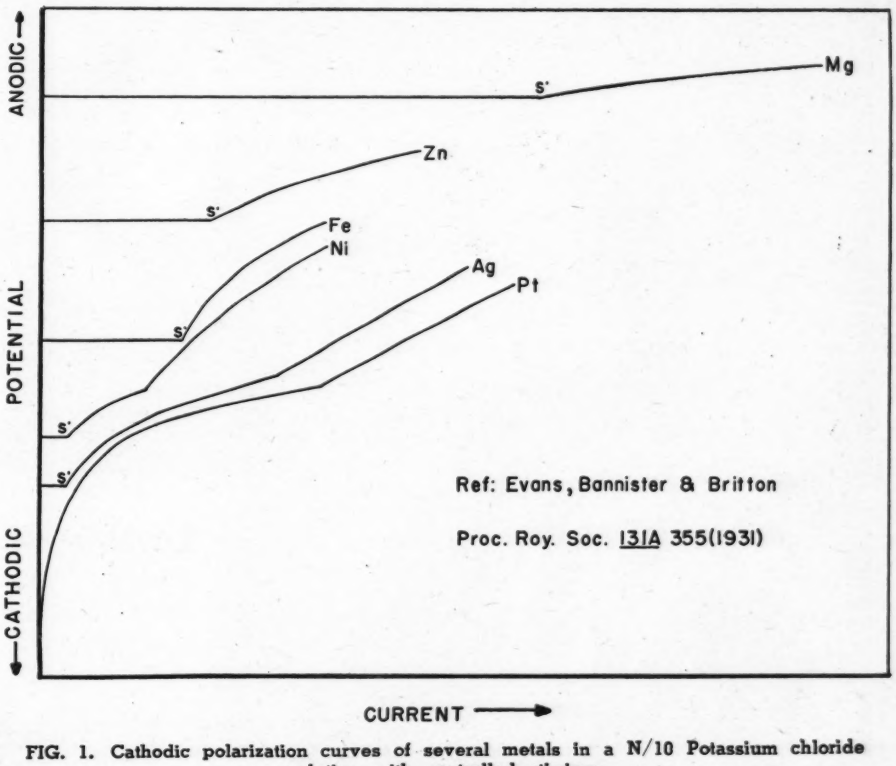


FIG. 1. Cathodic polarization curves of several metals in a N/10 Potassium chloride solution with controlled stirring.

New Billie Burke Show
CBS
Lovable Billie Burke—in her merry mix-ups—is heard over 134 stations of the Columbia Network every Saturday at 11:30 A.M., E.W.T.

quired can not be less than that which would be produced by free corrosion. It may be greater than this value, depending upon the type of corrosion control. If corrosion occurs under ideal cathodic control, then minimum protective current will be equal to that produced by free corrosion. If under mixed control, it will be greater than that produced by corrosion. Under ideal anodic control (no cathodic polarization) the current required for cathodic protection will be much greater than the current produced by free corrosion, depending upon the amount of cathodic polarization that can be produced by the applied current. One case has come to the attention of the authors where the protective current required was approximately one hundred times the current produced by free corrosion.

Colorimetric: Evans, Bannister and Britton [7] in studying the shape of cathodic polarization curves for a number of metals, in neutral salt solution, found that all the curves had one characteristic in common. Fig. 1 is a schematic representation of the type of curves they obtained on several metals. All the curves (except for platinum, a noble metal) are characterized by a horizontal portion. In the case of the iron specimen, ferricyanide was used as an indicator in determining when cathodic protection was complete. Complete cathodic pro-

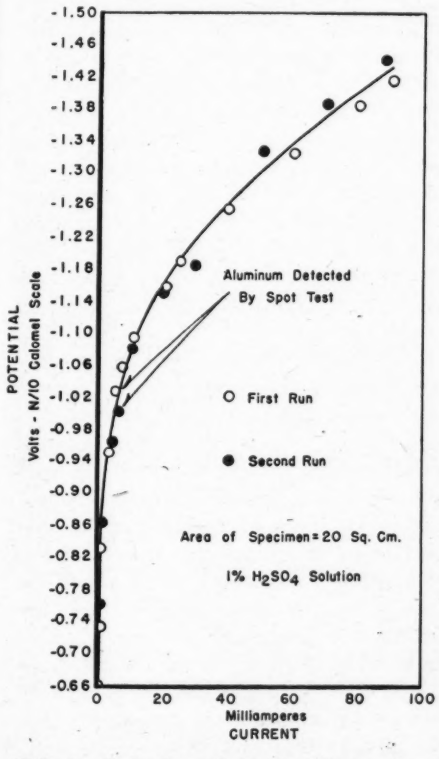


FIG. 3. Cathodic polarization of commercial aluminum (2S-H) in a 1% sulfuric acid solution.

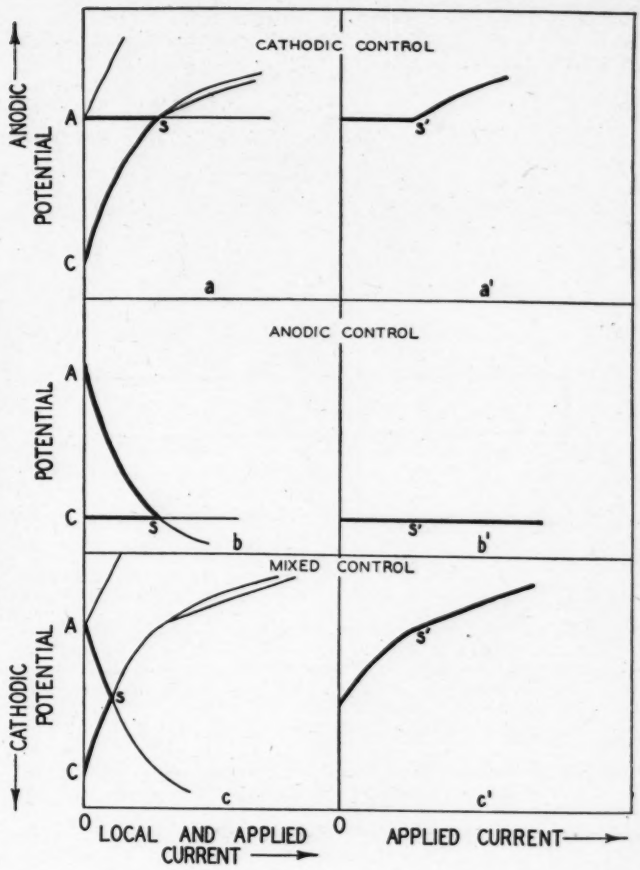


FIG. 2.

The diagrams on the left (a, b, c) show the individual polarization curves of the local anodes and cathodes for cathodic, anodic and mixed control, respectively. The diagrams on the right (a', b', c') show the polarization curves of specimens composed of local cells, as affected by externally applied cathodic currents. These latter curves can be derived from the diagrams.

$$\left[E'_a - \phi_a \left(\frac{I_a}{A_a}\right)\right] - \left[E'_c + \phi_c \left(\frac{I_c}{A_c}\right)\right] = E_{ac} \quad \text{⊕} \quad (1)$$

$$I_c = I_a + I_x \quad \text{⊕} \quad (2)$$

⊕ If the applied current is sufficiently high so that a cathodic current flows to the local anode as well as the local cathode then equation (1) becomes

$$\left[E'_a + \phi'_a \left(\frac{I_a}{A_a}\right)\right] - \left[E'_c + \phi_c \left(\frac{I_c}{A_c}\right)\right] = E''_{ac} \quad (1a)$$

and

$$I_x = I_c + I_a \quad (2a)$$

If no external current is applied then

$$I_a = I_c = I \quad (2b)$$

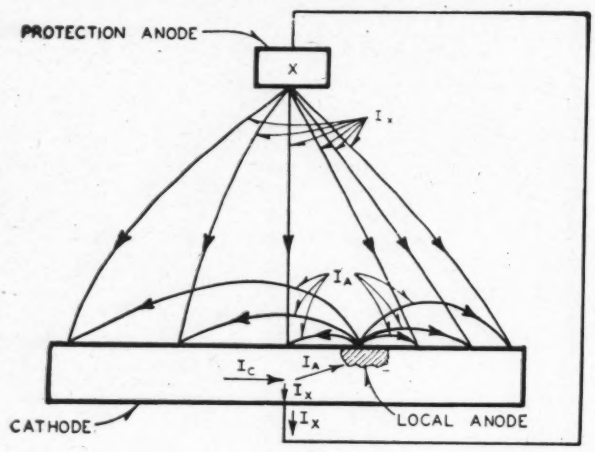
and equation (1) becomes

$$\left[E'_a - \phi_a \left(\frac{I}{A_a}\right)\right] - \left[E'_c + \phi_c \left(\frac{I}{A_c}\right)\right] = E_{ac} \quad (1b)$$

Where

E^a and E^c = open circuit potential of the anode and cathode respectively
I^a and I^c = anodic and cathodic currents respectively.
I^x = external applied cathodic current.
ϕ^a and ϕ^c = the anodic and cathodic polarization functions of these respective areas.
E^{ac} = potential difference between local anodes and cathodes.

FIG. 4. General Equations.



I_X = EXTERNALLY APPLIED CURRENT
I_A = CURRENT FROM LOCAL ANODE
I_C = TOTAL CURRENT TO CATHODE
E_{AC} = POTENTIAL DROP BETWEEN LOCAL ANODE AND CATHODE
E'_A = UNPOLARIZED OR OPEN CIRCUIT POTENTIAL OF THE LOCAL ANODE
E'_C = UNPOLARIZED OR OPEN CIRCUIT POTENTIAL OF THE LOCAL CATHODE
$\emptyset_A$ = POLARIZING FUNCTIONS OF THE LOCAL ANODE
$\emptyset_C$ = POLARIZING FUNCTIONS OF THE LOCAL CATHODE
A_A = AREA OF LOCAL ANODE
A_C = AREA OF LOCAL CATHODE

FIG. 5. A diagram illustrating the application of cathodic protection to a metal specimen containing a local anodic area.

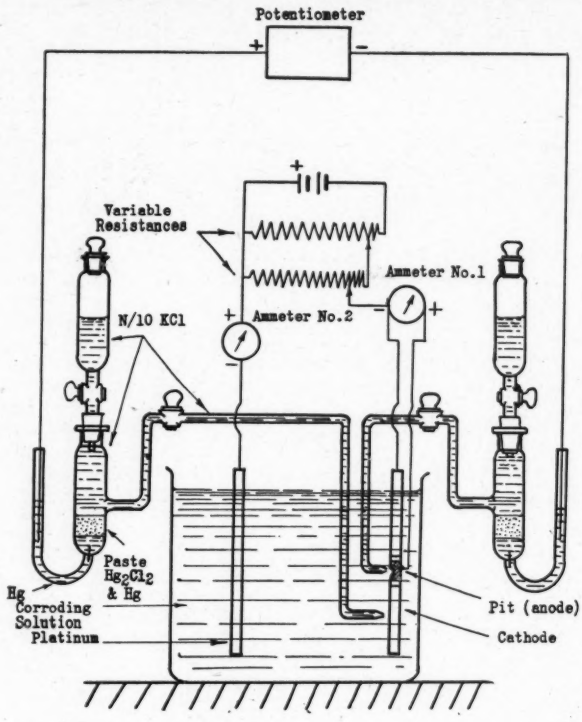


FIG. 6. Type of specimen, the electrode arrangement, and the electrical connections used for studying the degree of cathodic protection by means of the potential difference method.

tection was obtained at a sharp break in the curve (Fig. 1, Point S′).

If conditions permit the establishment of this type curve with a sharp break from the horizontal, then the current required for protection can be established. However, the location of the break is dependent on the types of polarization controlling the corrosion process. The three types of cathodic polarization curves can be derived if polarization curves of local anodes and cathodes are known. The cathodic polarization curves for specimens composed of local anodic and cathodic areas for three types of corrosion control (that is, anodic, cathodic and mixed) are shown in Fig. 2 a′, b′ and c′. It can be seen that data obtained by Evans and co-workers evidently were for specimens corroding under cathodic control (Fig. 2 a′).

Fig. 3 shows cathodic polarization curves obtained on commercial aluminum in a one per cent by weight H_2SO_4 solution. The current was first maintained at a high value. After steady conditions were obtained, the potential of aluminum specimens against the N/10 calomel electrode was determined. The current density was then decreased and the procedure was repeated. In this manner the curves shown in Fig. 3 were obtained. After steady conditions were attained for any value of current, this value was allowed to flow for at least 30 minutes. About 1 cc of the sample solution was removed from the vicinity of the specimen and tested for aluminum by means of a spot test. Either Eriochromcyanine R or Aurin tricarboxylic acid (aluminon) was employed for this purpose. Concentrations of aluminum as low as 2 ppm. can be detected readily by either reagent. At the critical value, the cathodic current was allowed to flow for as long as six hours without detection of aluminum in the solution. For values of current below the critical value, aluminum could be detected in the solution within five minutes after steady conditions were obtained. By comparison with Fig. 2 c evidently aluminum corrodes in dilute sulfuric acid under mixed control.

Thayer[8] employed colorimetric methods ingeniously by wrapping a white cloth treated with ferricyanide around a steel pipe at the place where corrosion occurred. Then the soil was replaced and cathodic protection applied. After 84 hours the pipe was again uncovered. If no blue coloration was noted, this area of the pipe was completely protected, but if a blue color was detected, the current was insufficient.

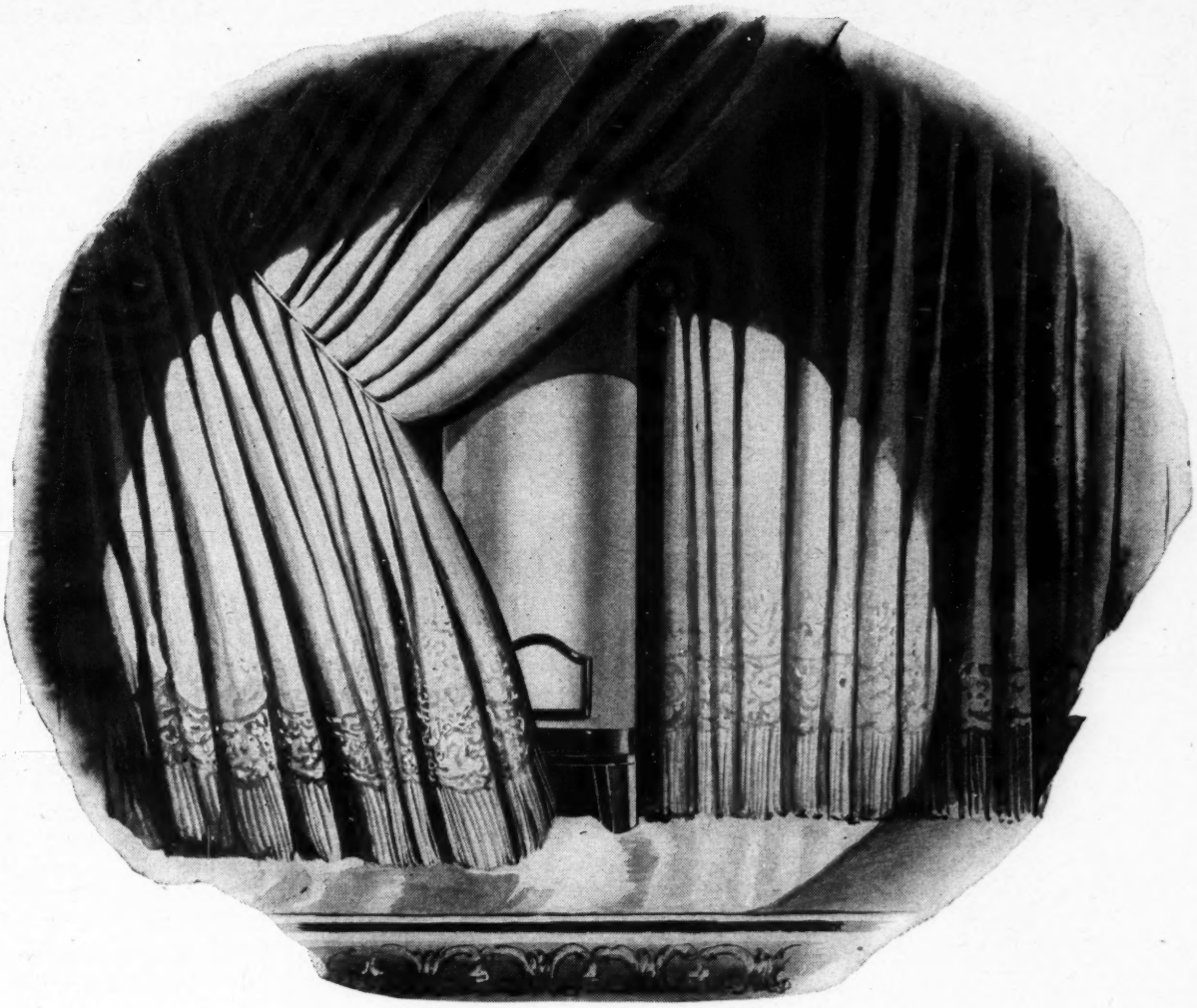
Colorimetric measurements are useful when conditions permit because they are simple and yield results in a short time. They have the obvious disadvantage that if the medium surrounding the article contains appreciable amounts of compounds of the metal being protected, then the detection of that metal has no significance as far as protection of the article is concerned. Likewise, surface films such as metal oxides, may dissolve with the result that detection of the metal ion does not mean that the article was attacked.

Electrochemical Methods: If conditions are such that the cathodic pol-

THIS MONTH GAS presents the last papers in the section on Cathodic Protection, theory and research. Other topics in this series which have been covered in previous issues are (1) Electrical Potential Phenomena (January, February, March); (2) Corrosion Coupons (April and May). (3) Pipe Coatings (June, July, August, September). The series will continue with sections devoted to Cathodic Protection, Application; Miscellaneous—Soil Surveys, Special Problems, Anaerobic Corrosion.

Guy Corfield

Technical Editor GUY CORFIELD is research engineer for Southern California Gas Co., a member of the AGA subcommittee on Pipe Coatings and Corrosion, and a director of the National Association of Corrosion Engineers.



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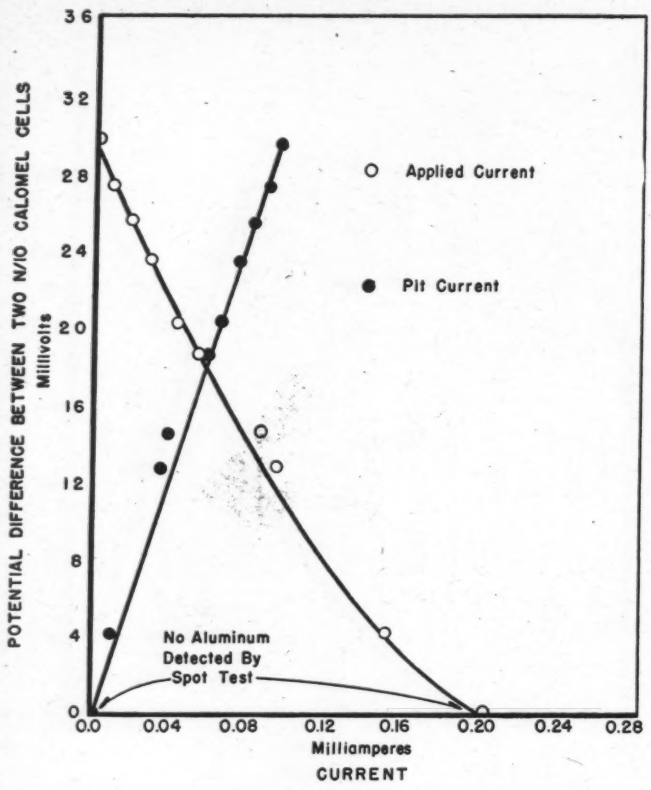

FIG. 7.

Relationship between the potential difference, and the applied current, and the corrosion current of commercial aluminum (2S-H) in a solution containing 4 grams per liter of sodium chloride.

arization curves give sharp breaks as shown in Fig. 1 a, the value of the minimum externally applied current required to achieve complete protection can be readily obtained. (Fig. 1, Point S′).

Pearson [9] has designed a null method employing a d. c. and a. c. bridge, whereby the polarization curves and the film resistance of the corroding objects can be determined. Pearson's method has the advantage that buried structures can be investigated without disturbing the structures. However, it is necessary that the anodic and cathodic polarization curves have sharp breaks corresponding to the open circuit potentials of the anode and cathode.

A direct electrochemical method has recently been investigated in this laboratory. By the application of Kirchoff's Laws and consideration of polarization effects the two general equations (Fig. 4) can be obtained for the relationship between the currents and the open circuit potential of the elements [4] with the aid of Fig. 3.

Now it follows that if no anodic current I_A is to flow then E_{AC} must equal zero. E_{AC} can be measured by placing a tip of one calomel electrode very close to the anode area and another close to the cathode area. Since no current can flow between points of the same potential, it follows that when the potential between the two electrodes is reduced to zero; that is, $E_{AC}=0$, then no current can flow between the local anodes and cathodes. If the mechanism of corrosion is electrochemical, then when $E_{AC}=0$ no corrosion of the local anode should occur.

In order to check the above ideas, the experimental setup shown in Fig. 6 was employed. The corrosive medium employed was four grams of sodium chloride per liter. An aluminum alloy specimen (2S) was protected by means of an applied current using an auxiliary platinum anode. The potential difference between the two calomel electrodes was measured as the protective current was increased. Fig. 7 shows the current flowing between the pitted and the unpitted area of the specimen as the potential difference between the pitted and the unpitted area was reduced. When the potential difference was reduced to zero, no current flowed between the pitted and the unpitted area. Similar results were obtained for a similar specimen in New Kensington tap water as the electrolyte. Again, no current flowed from the pitted area when the potential difference is reduced to zero.

The reliability of this potential difference method was subjected to further examination. The aluminum specimen was removed from the solution, thoroughly washed and placed in a fresh solution. The critical value of the protecting current was applied to this specimen (that is; the value required to reduce the potential difference between the pitted and the unpitted area to zero) and maintained for 24 hours. The spot tests described above for the detection of dissolved aluminum were made periodically. It was observed that no aluminum had dissolved during this 24-hour period. The applied current was then reduced just slightly below that required to reduce the potential difference to zero and spot tests made every 5 minutes. Dissolved aluminum was detected in the vicinity of the pits after about one-half hour. Consequently, it can be definitely concluded that when the potential differences between the anodic and the cathodic areas and the aluminum alloy specimens are reduced to zero by means of an externally applied current, no further solution of the aluminum occurred.

This method has the advantage that it is simple and direct. However, the anodic and cathodic areas on the structure being protected must be located and the reference electrodes placed near the metal surface at each of these areas. Hence, it may be necessary to place reference electrodes at several points in order to locate the anodic and cathodic areas on the structure. After the electrodes have been placed, the applied current is adjusted until the potential difference between the reference electrodes is reduced to zero.

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Proposed Line Would Carry Texas Gas to Mexico

The Texas Railroad Commission has refused to waive hearing on a proposed pipeline to carry South Texas natural gas to Monterrey, Mexico, according to Chairman Beauford H. Jester. Application for the pipeline is pending before the Federal Power Commission. It was requested that state investigation be waived.

Reynosa Pipeline Co. proposes to build a 14-in. line from La Blanca, South Weslaco and North Weslaco gas fields in Hidalgo County and to purchase 40,000,000 cu. ft. of gas daily from the La Gloria Corp., later increasing the amount to 60,000,000 if needed, Jester said. The pipeline proposes to deliver the fuel to Gas Industrial de Mexico, S. A., for use in Monterrey industries. Two other lines now carry Texas gas to Mexico.

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Selecting Regulators of Proper Capacity

By B. P. STOCKWELL
Senior Natural Gas Engineer
Public Service Commission of West Virginia, Charleston, W. Va.

AFTER an operating man has spent several days studying the literature furnished him by the various manufacturers in an attempt to determine the regulator of proper size and type to best handle a certain situation, his mind becomes more or less clogged with formulas containing K_H, K_L, K_{CH}, P_o h and various comparative charted statistics covering pressure versus valve lift, thrust on inter-valve versus valve lift, diaphragm pressure versus lever movement, diaphragm pressure versus diaphragm movement, as well as the many discussions on quick opening valves, V-port valves, ratio plug valves, throttling plug valves, etc. In addition to this, he may have added to his worries and complications the deciphering and understanding of one or more nomographs, more commonly called regulator capacity charts.

After reaching this point, he has about decided that the selection of the proper regulator for the purpose he has in mind is not quite as simple a procedure as he at first thought. In fact, he quite often decides that the whole problem is too complicated for him to attempt to determine scientifically by the use of all the various formulas and graphs. Therefore he follows the line of least resistance and installs for his customer a high or low pressure regulator, as a case may be, of the same size as the line that happens to be installed to serve that customer, and hopes that its capacity will be approximately right for the service desired.

Methods of Selection

It is quite obvious that this plan of selecting regulators results in the installation of equipment of improper capacity at least as often, if not more often, than it does happen to fit the situation. While the writer of this paper does not propose or attempt to set out a short and easy method of determining proper regulator capacity, he does hope to discuss some of the methods offered by the manufacturers, and also attempt to bring to your attention some of the differences in the manufacturers' methods of determining proper capacities. These variations in design and methods of capacity determination, together with your knowledge of certain regulators operating today that are very much oversized for the function they are attempting to perform, should serve as danger signals to you in the future when you are attempting to select the proper regulator for a certain job.

There are a few essential facts about pressure regulators which we must recognize. First, and perhaps most important, we should never apply to any part of a system more pressure than it can withstand safely. The bursting of parts or excessive leakage must be avoided; this can be done only by regulating the pressure to all parts of the system. Second, there are many locations in the system where the rate of flow must be measured. Meters will record the flow in cubic feet, but since gas is compressible, the actual cubic feet passing must be determined on some specified pressure base. Therefore, at points of measurement the pressure must either be controlled or recorded; usually, accurate pressure control is the most satisfactory way to insure proper and accurate measurement. Third, proper pressure regulation is essential if most efficient combustion is to be attained. Efficiency of combustion and safe operation of gas-burning appliances depend very materially upon pressure control. These three considerations — safety, measurement, and combustion—are the main objectives of accurate pressure control.

In normal pressure regulation the main purpose is to control the pressure at the outlet or downstream side of the regulator. To do this practically, every device has four essential parts.

First, it has an element usually called a responsive element to which the pressure to be controlled is applied. This usually takes the form of a diaphragm.

Second, there is a standard to which this responsive element compares or adjusts itself. This may be a compression spring, a weight, a lever and weight system, or a chamber in which a secondary pressure is accurately controlled.

Third, there must be a unit of this device interposed in the flowing gas stream which, by forming a restriction, controls the flow of gas to the point at which the pressure is to be controlled. This may be a balanced valve of the poppet type, a butterfly valve, a vane, or some other form of variable restriction.

The fourth element is the connection between the pressure responsive device and the flow restricting device, which may be a simple mechanical connection such as a pin or a lever, or it may take a more complex form.

Four Essential Factors

In selecting the regulator which will give the best of all four essential factors in the design, an analysis will have to be made of the requirements and specifications for the installation. In making this analysis, the following points should be considered:

1. Range of outlet pressure control desired.
2. Accuracy of control.
3. Rate of flow, maximum and minimum.
4. Inlet pressure conditions.
5. Pressure build-up permitted at zero flow.
6. Ruggedness and simplicity of the apparatus.
7. Ease of repair and maintenance.

It is necessary to know the range of outlet pressure desired in order to select the size diaphragm that will properly control a certain outlet pressure. Larger diaphragms provide greater controlling area and are, therefore, more sensitive than smaller ones. Thin diaphragm material is more flexible and, therefore, provides more sensitive control. However, both diaphragm size and strength of diaphragm material are limited as to the pressures they will withstand. For this reason, as outlet pressures increase, diaphragm cases are made smaller and diaphragm material used is heavier, stronger and, therefore, less flexible.

The accuracy of control should be known at the time the regulator is selected. Low-pressure distribution regulators ordinarily are expected to control within 1 or 2 in. water column under normal operating conditions, while a high-pressure field regulator nor-

*This study by Mr. Stockwell was first published in the proceedings of the Fourth Annual Appalachian Gas Measurement Short Course, Technical Bulletin No. 22, Engineering Experiment Station, West Virginia University.

mally is expected to have a variation in outlet pressure of several pounds, generally less than 10% of the controlled pressure. Small appliance regulators have a limited outlet pressure under AGA specifications of only ½ in. water column.

Rate of Flow Important

The rate of flow is very important in the selection of the proper regulator. If possible of attainment, the maximum, minimum, and normal rates of flow should be known when choosing regulator sizes. We must know the maximum rate of flow to select a regulator of sufficient size and, in most instances, we should know the minimum rate of flow to insure proper performance of the regulator as the load is decreased. These rates of flow should not be a "horseback" guess upon the part of the operator, but, if not definitely known, should be carefully estimated and should be used as estimated without the application of any safety or modifying factor. Most of the errors made in selecting regulator sizes arise from being too conservative in stating loads, either from fear the selection will be too small or from lack of actual knowledge of the load. This leads to the selection of too large a regulator with consequent poor performance. Never should a regulator be selected as being the proper one for a certain installation merely because it is of the same size as the line to which it is to be connected.

It is obvious that inlet pressure will affect regulator type and size. First of all, the regulator must be so designed that it will mechanically withstand the highest inlet pressure to be imposed upon it. The designer has to consider, in some instances, the abrasive action due to high velocity gas, the possibilities of freezing, and other less common conditions. Generally, it is desirable to have the valve off its seat a fair distance during normal operation in order to prevent excessive wear that usually accompanies wire drawing. For a given rate of flow, a certain size valve would be much closer to its seat with a high inlet pressure than if that pressure were lower. In order to provide a normal distance between valve and seat on regulators operating with high inlet pressures, the valves are made smaller in size and thereby provide the same flow at normal operating distance between valve and seat as would be attained with a larger valve and a smaller operating distance between valve and seat.

A very great portion of the regulators in use are required at some time to shut off the flow of gas completely, due to the discontinuance of the use of service by the consumer or consumers supplied. At these times it is quite desirable that the regulator perform this function without permitting an appreciable build-up of the controlled pressure. In most instances where this condition occurs it has been found necessary to use regulators with soft-seat valves which can effect a positive shut-off. In other cases where zero shut-off is not required, more durable hard-seat valves are generally used.

Since all mechanical equipment requires occasional attention and inspection, the ease with which this may be accomplished is another factor which should be given consideration when selecting regulators. Some regulators are so designed that they can be repaired easily, valves changed, etc., without removing the regulators from the line.

The methods of determining regulator capacity vary somewhat among the different manufacturers. Four of the manufacturers, supplying regulators quite commonly used, employ the formula for flow through an orifice. They disregard the temperature factor, assuming a specific gravity of six-tenths and by experimentally determining constants applicable to each size regulator for flows both above and below critical velocity, they calculate the regulator capacity in cubic feet of 4-oz. pressure base gas. The following quotation indicates the method followed by one of these manufacturers.

> The high pressure . . . regulator passes its maximum volume when the valves are raised to their wide-open position. *Under these conditions, the well-known flow formula has been found to apply to . . . regulators* and is expressed as follows:
>
> $Q = K_H{}^2 \sqrt{P_o h}$ where
>
> Q = number of cu. ft. per hr. at a base pressure of 4 oz.
>
> P_o = absolute outlet pressure in psi.
>
> h = drop in pressure across the regulator in psi.
>
> K_H = a constant depending on the size of the regulator valve openings and is determined experimentally for each size.

The preceding formula applies below the critical or acoustic velocity of the gas, and it is used in computing the table of capacities in that range.

If the ratio of the outlet pressure absolute to the inlet pressure absolute is less than .528, the gas has reached its maximum velocity and cannot be made to move any faster, and what is termed the critical velocity of the gas is reached. Although the gas cannot be made to move at a greater velocity, the actual weight of gas moving can be increased by increasing the density of the gas as it passes through the mini-

TABLE 1

	2-in. H P Reg.		6-in. H P Reg.	
	P_i = 100 lb.	P_o = 50 lb.	P_i = 100 lb.	P_o = 50 lb.
Make	*Hourly Max. Cap.*	*Recommended Capacity*	*Hourly Max. Cap.*	*Recommended Capacity*
	Mcf.	*Mcf.*	*Mcf.*	*Mcf.*
A	200.0	73.3	920.0	306.6
B	132.8	132.8	936.4	936.4
C	175.0	175.0	1002.0	1002.0
D	155.0	155.0	1250.0	1250.0
E	313	104.3	1800.0	600.0
*F	109.3	109.3	948.8	948.8
	2-in. H P Reg.		6-in. H P Reg.	
	P_i = 300 lb.	P_o = 50 lb.	P_i = 300 lb.	P_o = 50 lb.
Make	*Hourly Max. Cap.*	*Recommended Capacity*	*Hourly Max. Cap.*	*Recommended Capacity*
	Mcf.	*Mcf.*	*Mcf.*	*Mcf.*
A	622.5	207.5	5061.8	1687.3
B	367.1	367.1	2588.6	2588.6
C	620.0	620.0	3700.0	3700.0
D	430.0	430.0	3300.0	3300.0
E	867.0	255.6	4975.0	1658.3
*F	300.2	300.2	2607.0	2607.0
	2-in. L P. Reg.		6-in. L P Reg.	
	P_i = 10 lb.	P_o = 4 oz.	P_i = 10 lb.	P_o = 4 oz.
Make	*Hourly Max. Cap.*	*Recommended Capacity*	*Hourly Max. Cap.*	*Recommended Capacity*
A	38.0	12.6	428.0	142.6
B	31.2	31.2	276.1	276.1
C	25.0	25.0	205.0	205.0
D	42.0	42.0	330.0	330.0
E	65.5	21.8	346.0	115.3
*F	22.8	22.8	198.0	198.0

*Capacities determined by the following proposed method.

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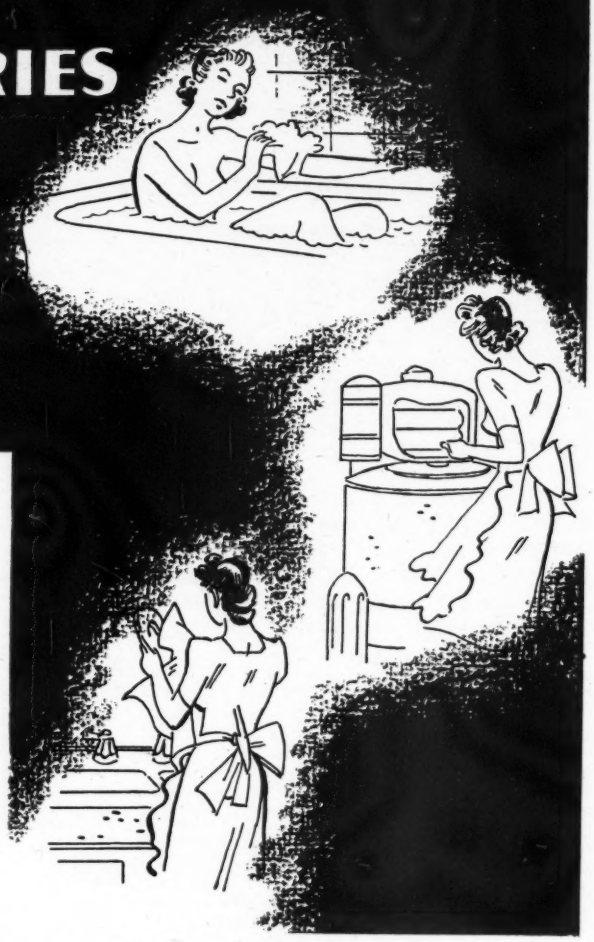

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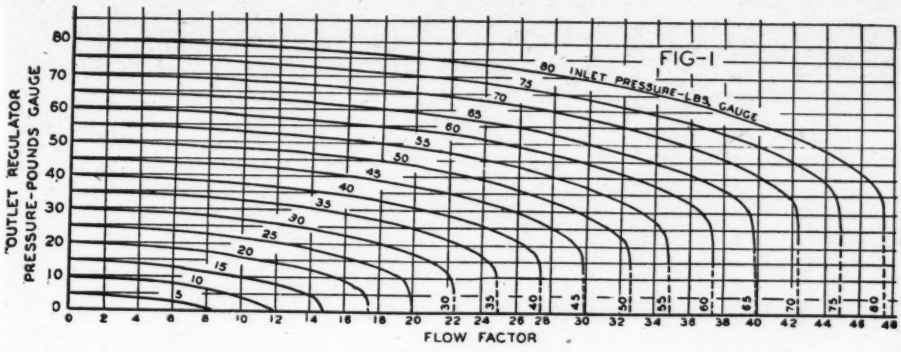


FIG. 1

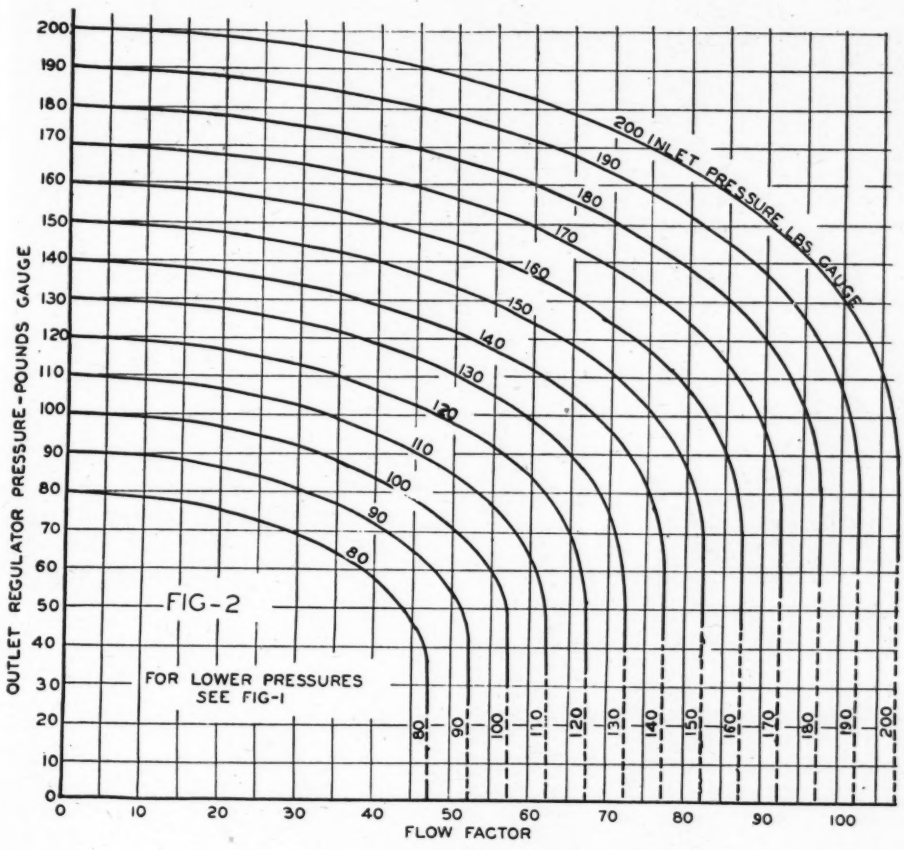


FIG. 2

mum restriction. Density depends directly on the absolute pressure of the gas; therefore, the actual weight of gas (moving through the minimum restriction) which later expands to the outlet pressure, determines the final outlet volume. In other words, above the critical velocity the volume ability of the regulator is directly proportional to the absolute pressure.

Just at the critical velocity,

$P_o = .528\ P_I$ or $P_I = 1.894\ P_o$

where

P_o = absolute outlet pressure and
P_I = absolute inlet pressure,

then

$$Q = K_H\ P_o\ (P_I - P_o) =$$
$$K_H\ P_o\ (1.894\ P_o - P_o) =$$
$$K_H\ .894\ P_o^2 =$$
$$.947\ K_H P_o$$

Now, if the inlet pressure is increased above 1.894 P_o, the actual volume of gas passed is proportional to the ratio of the absolute inlet P_I to the absolute inlet pressure at the point of critical velocity. Thus, Q above the critical range becomes

$$.947\ K_H\ P_o \times \frac{P_I}{1.894\ P_o} =$$
$$\frac{.947}{1.894} K_H P_I =$$
$$.5\ K_H\ P_I$$

It will be seen then that *there are really two formulas for the capacity of the high-pressure regulator:* one to be used when the drop in pressure across the regulator is such that the critical velocity of the gas has not been reached, and another to be used for those cases when the drop in pressure is enough to cause the gas to flow at its critical velocity. Critical velocity is reached when $P_o = .528\ P_I$.

When P_o is greater than .528 P_I, the formula to use is $Q = K_H\ P_o h$, which gives the volume in cu. ft. per hr. at 4-oz. pressure base.

When P_o is less than .528 P_I, the formula to use is $Q = .5\ K_H\ P_I = K_{CH}\ P_I$, which gives the volume in cu. ft. per hr. at 4-oz. pressure base.

Two other manufacturers that supply a considerable portion of the regulators used by the oil and gas industry as well as by other types of customers provide nomographs which they call gas capacity charts or valve selector charts, from which the capacities of the various regulators they manufacture can be determined for most any operating condition that might develop.

With regard to this type of chart for the purpose of determining regulator capacity, one of these manufacturers states:

> All of these charts are computed from actual test data, and in the conducting of these tests, which were run over a period of some four years in our research and testing laboratory, *we found that there was no such thing as a constant by which you could use formulas for determining the flow through these valve bodies.* For instance, you can set up a given test and determine a constant, let us say, on a 2-in. size, with the inner valve open ⅜ in. Under that condition there is a certain turbulent action in the various contours of the valve body and inner valve, but if you move the inner valve to, say, ¼ in. open or to ⅝ in. open, that constant changes considerably, due to the difference in turbulence in the valve body, and pressure drops occurring at new places. Therefore these capacities are the result of actual tests with the inner valve set in all of those respective positions under all the various pressure conditions.

It will be noted that in the quotation first mentioned above, the manufacturer definitely indicates that the flow through a regulator does follow the orifice formula; that, in his opinion, constants can be determined for each size regulator applicable to flows occurring through regulators that are below critical velocity; and that other similar constants likewise can be determined to apply in this formula for flows at or above critical velocity. It will also be noted that in the second quotation above, the manufacturer states that their investigations have indicated there was no such thing as a constant that could be used in a formula for determining the flow through regulator valve bodies. The writer is in no position to state that either of these statements is correct; in all probability they may both be correct, for the statement made by either manufacturer may apply to his own regulator, and that only.

As may be expected, after the above discussion of different methods of figuring capacity on different types of regulators, the capacities, as indicated by the manufacturers, determined by

TABLE 2. "K" FACTORS

Size Regulator	"K" *Factor*
3-in. (¾-in. balanced valves)	.43
2-in. (1-in. balanced valves)	1.4
2-in. (Std. balanced valves)	1.9
3-in. (Std. balanced valves)	4.2
4-in. (Std. balanced valves)	7.5
6-in. (Std. balanced valves)	16.5
8-in. (Std. balanced valves)	27.5
10-in. (Std. balanced valves)	42.0
12-in. (Std. balanced valves)	61.0

their respective methods, differ considerably among regulators designed for the same purpose and being of the same nominal size. A comparison of capacities of different manufacturers' regulators, operating under the same load and pressure conditions, appears in Table 1.

Some of the operators in the Appalachian area, realizing the wide variation in manufacturers' capacity ratings, have devised a method of determining regulator capacity which they contend is less complicated, fairly conservative and yet sufficiently accurate that it can be applied to most any high or low pressure regulator, regardless of make, and determines its capacity with a reasonable degree of accuracy.

This capacity data is based on conclusions, resulting from experimental data, that valve opening area in excess of 60% of the regulator outlet opening is not effective in producing additional regulator capacity. In the few cases where regulators have valve sizes less than this amount, their capacity should be reduced accordingly.

The determination of capacities by this method is simple. The three charts, Figs. 1, 2 and 3, are used.

These charts are based on the following equations:

1. Where the flow is below critical velocity,

$$Q = K^2 \sqrt{h\, P_o}$$

2. Where the flow is above critical velocity,

$$Q = \tfrac{1}{2}\, K.\, P_I$$

Where

Q = M cu. ft. per hr. of .66 sp. gr. gas at a base pressure of 14.65 psi. absolute.

h = Drop in pressure across regulator in psi.

P_o = Absolute outlet pressure in psi.

P_I = Absolute inlet pressure in psi.

K = Constant, based on a study of available data; and from experience by the committee determining the metered rate of flow through wide-open regulators.

The factor on Figs. 1, 2 and 3 labeled as "Flow Factor" (shown on bottom scale) is equal to

$$^2\sqrt{h\, P_o}$$

for conditions outlined under equation (1); and is equal to $\frac{1}{2}\, P_I$ for conditions outlined under equation (2).

These flow factors, when multiplied by the following "K" factors, give the recommended maximum capacity of the regulator in Mcf. per hour of .66 sp. gr. 14.65 lb. absolute pressure gas. Table 2 gives the "K" factors.

There may be instances where special regulators are in use and it is desired to obtain their approximate capacity. This may be done by determining the valve opening area in terms of square inches and using a "K" factor of 1.00 for each square inch, provided this area is no greater than approximately 60% of the regulator outlet pipe opening. If the valve opening area is greater than 60% of the outlet pipe opening, the valve opening area above this amount should be ignored. The approximate regulator capacity is then equal to "K" x flow factor, in the same manner as though the "K" were taken from the table.

To determine maximum capacity of regulator by this method:

1. Locate outlet pressure on left margin of graph.

2. Trace horizontally to estimated minimum inlet pressure.

3. Trace vertically down and read "Flow Factor" on bottom scale.

4. Maximum hourly capacity = flow factor × "K" factor.

Example:

Assume—A 6-in. regulator, 25 lb. outlet gage pressure, and an estimated minimum inlet gage pressure of 40 lb.

Then—From graph (Fig. 1) flow factor = 24.5.

From table "K" factor = 16.5.

Maximum regulator capacity = 24.5 × 16.5 or
400 Mcf. per hr.

To determine size regulator required when the quantity and pressure conditions are known:

Example:

Assume — A maximum hourly rate of flow 100 Mcf. per hr., an outlet pressure of 100 lb., and an estimated minimum inlet pressure of 250 lb.

Then—From graph (Fig. 3) flow factor = 133

"K" factor required = 100 ÷ 133 or .75.

It will be noted from table of "K" factors that a 2-in. regulator having 1-in. balanced valves will have ample capacity.

This method of regulator capacity determination is offered because it is believed to be sufficiently accurate for practical purposes and simple enough that any operator can easily use it.

The writer does not feel that this paper has given you a practical and complete answer to the question of how best to proceed on a practical basis in the selection of a regulator of proper capacity to perform a certain function. However, it is hoped that this paper has raised sufficient questions to prompt a careful study and investigation of all conditions involved that might affect proper operation before deciding upon the particular make, type, size and kind of regulator best to install, for any service where such is needed.

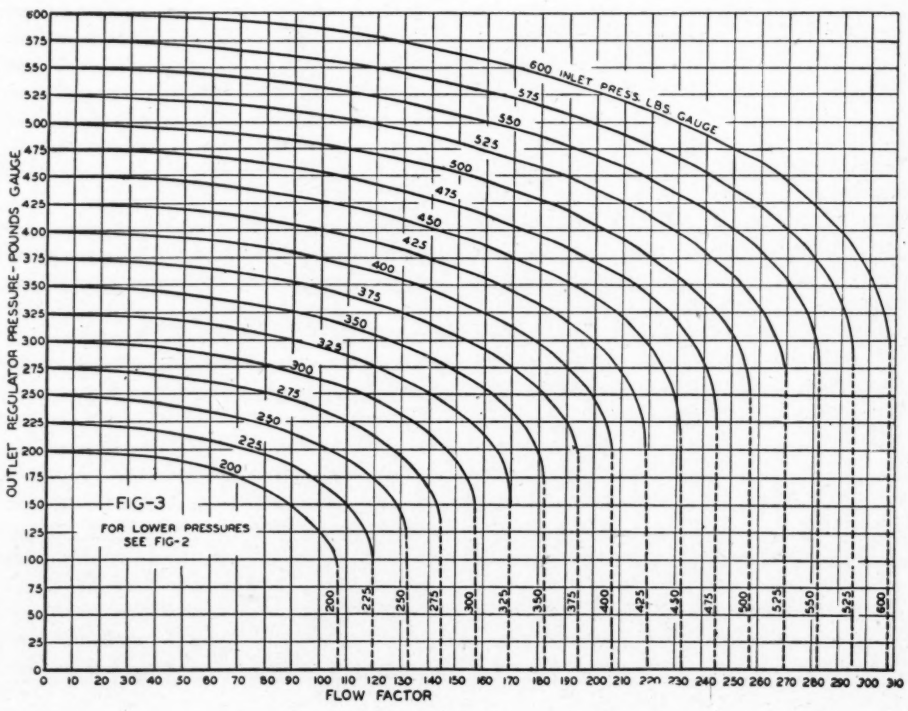
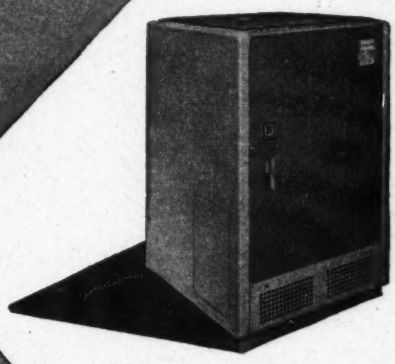


FIG. 3

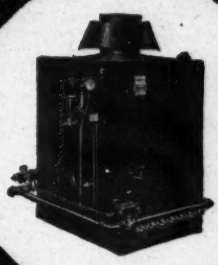
GAS-FIRED

AMERICAN HEATING EQUIPMENT

Gets the most out of Gas Fuel!

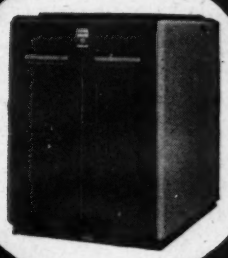


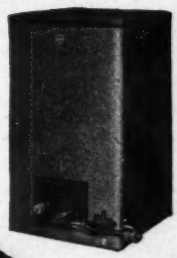
EMPIRE GAS BOILER



STANDARD GAS BOILER

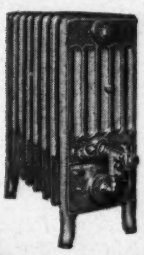
MOHAWK GAS FIRED WINTER AIR CONDITIONER





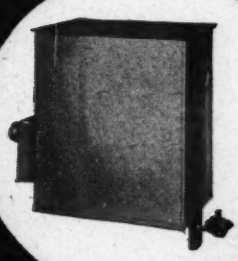
SHAWNEE GAS FIRED WARM AIR FURNACE

BUDGET GAS FIRED WATER HEATER



AMERICAN GAS FIRED STEAM RADIATOR

AMERICAN GAS CONVERTER



SAGINAW GAS FLOOR FURNACE

These outstanding products have the right design and precision controls to get the most out of gas fuel. They make satisfied users. You can sell or recommend them with complete confidence in their outstanding quality and dependability.

The complete line of products, some of which are shown here, meets every requirement of heating and hot water supply. Many are available for essential uses under WPB Limitation Orders; others probably cannot be furnished until the war is won.

Inquiries regarding the availability of any of our products are invited.

AMERICAN RADIATOR & Standard Sanitary

New York CORPORATION Pittsburgh

Pittsburgh Utilities Plan Postwar Development

THE natural gas companies in the greater Pittsburgh area recently met to promulgate a plan for trade development postwar — specifically, the expansion of gas range sales—in the territories they serve. They had facts and figures, and what they considered a sound, constructive approach to the problem, i.e., the coordination of promotional activities among gas utilities, range manufacturers, jobbers and dealers. The plan was crystallized in a booklet entitled "A Plan for Building Post-War Gas Range Sales Volume in the Pittsburgh Area," was presented to manufacturers and met with instant success.

In the opening pages of their brochure, the group stresses the fact that Pittsburgh is a "natural" marketing territory. It is a homogeneous area possessing all natural gas, geographically compact, with similar population character and similar climatic and economic conditions. Further, eleven years of uninterrupted advertising and sales efforts have yielded increased meter service—even through the war. The need for new, modern ranges is recognized, and the gas companies are determined to protect their cooking loads by promotion through dealers.

The history, objectives and past achievement of the group are revealed, the last figures of which should be of interest. Average gas range sales price increased from $79.50 in the fall of 1939 to $108.41 in the fall of 1941—a 38% increase. In the first CP promotion in 1940, 192 dealers, or 37% were stocked with CP ranges, and average sales price was increased from $119.02 in 1940 to $133.47 in 1941.

Appliance promotion had clearly set itself as a major element in range promotion and dealer cooperation had reached a gratifying high. The Pittsburgh range market, based on one gas range for every 10 meters—the national average for the last five pre-war years—showed interesting statistics:

Total domestic gas meters	915,022
Total gas range dealers	1,000
Normal gas range sales (per year) (shipments)	91,500

In planning the annual average gas range sales quota for the first five postwar years, this statement appears: "Based on a 1943 survey of a portion of the market, it is estimated that the average age of ranges at the war's end will be about 10 years. From a competitive standpoint, this average is too high, and it will be desirable to reduce it, say, five years by the end of the five-year period following the conclusion of the war. To do this will require the sale of an average of approximately 125,000 gas ranges per year for this five-year period." There followed the suggestion that division of the total annual quota be 10% to gas companies and 90% to dealers.

Finally, the gas companies feel that success of this postwar plan will be realized only if the best representatives and dealer outlets are secured, if a semi-annual, large-scale promotional campaign is conducted, if close dealer contact is maintained and if the Gas Appliance Promotion Division (which represents the group) is utilized as a "central clearing house for gas range promotional activities." Then, natural gas companies, manufacturers and dealers in the greater Pittsburgh area may justifiably look toward increased gas range sales, better quality ranges, a "maximum of promotional activity at a minimum cost," and a formidable position in the competitive market.

When Mother was a Girl,
the dealer showed this as the "last word" in a Gas Range!
but . . . Mother and Grandmother, too
both envy you the beautiful
efficient GAS RANGE
as we know it today!
PLAN NOW . . . FOR YOUR ALL-GAS HOME
Natural Gas Companies

One of the newspaper advertisements which the natural gas companies serving the greater Pittsburgh area are currently running to stir up thought on the gas range of the future.

Consolidated Edison Surveys N. Y. Manufacturing Facilities

In order to help industry in the metropolitan area obtain as much postwar work as possible and get it as soon as production for civilian purposes is permitted, Consolidated Edison Company of New York, Inc., and its System Companies are making a comprehensive survey of the manufacturing facilities in Manhattan, the Bronx, Brooklyn, Queens and Westchester County.

Technically trained field employes of the Edison System are interviewing 24,000 industrial concerns to obtain information on the products that they can manufacture, as well as on processing facilities. The survey, which will bring together much information not heretofore available, will cover products manufactured in the pre-war period, at present and those contemplated or possible of manufacture in the postwar period; number of employees in the prewar period, the war period, an estimate of the number for the postwar period broken down into male and female groups; plant data, research and engineering facilities, railroad siding and dock facilities, and the like.

FPC Permits Louisville To Tap Tennessee Line

The Louisville Gas & Electric Co. has been authorized to tap the natural gas pipeline from Corpus Christi to West Virginia, built by Tennessee Gas & Transmission Co., according to an FPC ruling. The Louisville company will build and operate a 65-mile pipeline from Calvary, Ky., and will take 10,000,000 cu. ft. a day to supplement the needs of Louisville and its environs.

The FPC stated that the Public Service Commission of Kentucky approved construction and operation of the facilities, which FPC ordered completed not later than Jan. 31, 1945. The gas to be obtained from the big line is to supplement the Louisville company's existing supply.

Protest was made by the State of Pennsylvania against drainage en route, on the grounds that the big line will not supply enough gas for the Appalachian industrial plants if it is tapped along the line.

Detroit Co. To Produce New Gas Refrigerator

With midwest sites in Ohio, West Virginia, Kentucky and Indiana under consideration, Clayton and Lambert Co. of Detroit has announced the blueprinting of plans for conversion from war time contracts to the peacetime manufacture of gas fueled refrigerators in the domestic field.

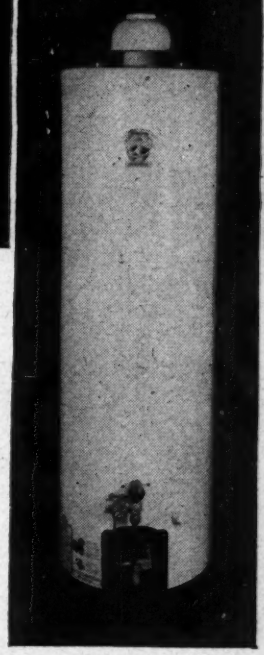
Now engaged in making metal stampings under government contracts, Clayton and Lambert have acquired manufacturing and selling rights for the new refrigerator and their plans include employing the 45,000 workers now engaged in war production in their Detroit and Ashland, Ky. plants, for the swing over into the new field.

EVERY PART IS MADE BY RHEEM

Every part that goes into a Rheem Automatic Water Heater is designed and built by Rheem . . . tanks, burners, controls—they're *all* made by Rheem.

Rheem plants serve all markets—are strategically located from Coast to Coast, and from the Great Lakes to the Gulf.

Rheem Automatic Water Heaters are made for *all* types of fuel—gas, bottled gas, electricity, oil and coal. They are moderate-priced and *reliable*.



Rheem Arrowhead Automatic Gas Water Heater.

RHEEM

RHEEM MANUFACTURING COMPANY

Executive and General Sales Offices: New York • San Francisco • Los Angeles • Washington, D. C.

PLANTS LOCATED AT:

Bayonne, N. J. • Birmingham, Ala. • Chicago, Ill. • Danville, Pa. • Houston, Texas
New Orleans, La. • Portland, Ore. • Salt Lake City, Utah • Sparrows Point, Md.
Maywood, Richmond, South Gate and Stockton, Calif.
Sydney, Melbourne and Brisbane, Australia

AGAEM to Certify House Heating Equipment

POSTWAR home buyers are to be assured of the satisfactory performance of their heating system before the system is installed, according to plans of the Association of Gas Appliance and Equipment Manufacturers announced Nov. 21.

"The agreed-upon method of certifying home heating performance is one of the most constructive steps taken by the industry in protecting the interest of home buyers," declared E. A. Weaver, chairman of the association's committee which brought the plan into working order. He is sales manager of the "Janitrol" heating division of Surface Combustion, Toledo.

The association has approved a set of standards covering controlled temperatures, controlled air circulation, humidification and air filtering. Any house built according to these standards will receive the association's certification of satisfactory performance, it was explained. The standards will be available to architects, house builders, heating contractors and home owners.

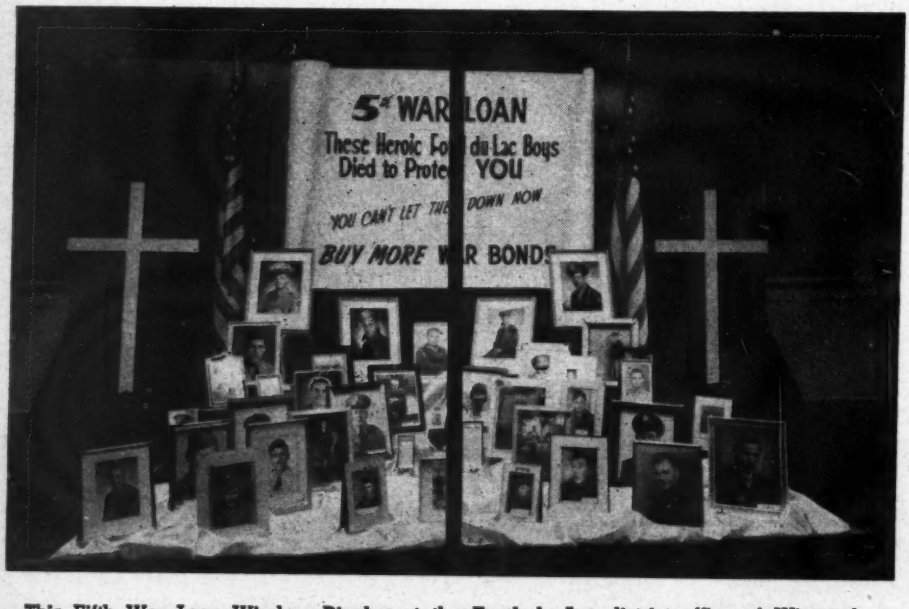
More common causes for unsatisfactory heating were attributed to the practice in some quarters of skimping on the size of ducts, the number of outlets per room, the gauge of metal used, or by installing a furnace too small for the house.

To some extent, the heating standards set by the manufacturers follow the Certified Performance plan for gas ranges. Not only have the competitive manufacturers agreed on the home heating standards, the committee chairman said, but they also have been correlated with the American Society of Heating & Ventilating Engineers, the Bureau of Standards, the American Standards Association, gas company engineers and other heating authorities. The heating units of the manufacturers must pass minimum requirements of American Gas Association in addition to the certified quality in order to qualify in the certification plan.

The Association of Gas Appliance & Equipment Manufacturers will undertake an education program to acquaint the public on how certified heating performance may be obtained and co-operation of local gas companies is being sought in putting the plan into action.

The local gas company, or some other designated authority, would check blueprints before construction of the house is started to ascertain that heating plans meet standards. Next step would be to check the house during construction to see if plans and specifications were being followed, and a final check on the system would be made when the house is completed.

Members of the association's certified heating performance committee, in addition to Chairman Weaver, of Surface Combustion, are: W. L. Seelbach, Forest Cities Foundries Co., Cleveland; Gordon Rieley, Bryant Heater Co., Cleveland; R. W. Clewell, Richmond Radiator Co., New York City; Elroy Payne, Payne Furnace & Supply Co., Los Angeles; R. L. Blodgett, Pennsylvania Furnace Co., Warren, Pa.; Mr. Faust, General Electric Co., Bloomfield, N. J.; Harold Massie, American Radiator & Standard Sanitary Co., Pittsburgh; and J. R. Scott, Mueller Furnace Co., Milwaukee.



This Fifth War Loan Window Display at the Fond du Lac district office of Wisconsin Power & Light Co. won third prize in the Display World National Contest. The display was created by M. R. Norton, district sales supervisor, and attracted much attention because of the photographs of Fond du Lac service men who gave their lives.

Two-way Radio Equipment Available Through OWU

Edward Falck, director, Office of War Utilities, informed utilities in October, that a small quantity of two-way mobile radio transmitting and receiving equipment has been made available recently for installation, where there is an important need for the equipment.

Applications should be filed with the Federal Communications Commission concurrently with filing applications with the War Production Board for preference ratings. However, no one should file an application unless he can show that the installation will make possible substantial savings of man-hours and truck time and travel, improvement in system operation, or substantial increase in reliability of local service to consumers.

Houston Natural Plans New Service Headquarters

Houston Natural Gas Corp. has purchased a 9-acre, triangular plot of ground as the site for new service and warehouse headquarters to be erected after the war, according to Frank C. Smith, president. Cost of the property was $60,000.

Construction plans include a large warehouse, garage, dispatcher's office and meter shop. Consideration also is being given to a recreational building in which assembly rooms will be provided for company meetings, training classes, and special demonstrations. Additional facilities are being contemplated for the use of company employes and their families. It is estimated that the total cost of all construction will run between $150,000 and $200,000.

Display Committee Sponsors Sixth War Loan Contest

To spearhead the industry's Sixth War Loan Drive, the A.G.A. Window & Store Display Committee is sponsoring an independent window display contest. Each display must feature a $100 War Bond or a reproduction thereof. Entries must be post marked by midnight of December 26 and mailed to A.G.A. Sixth War Loan Contest Committee, care A.G.A., 420 Lexington Ave., New York (see cut).

Photographs of displays will be judged on bond selling appeal, attention, value, artistry, and originality. Prizes are $50 and $25 war bonds. Contest rules may be had by writing to George W. Browne, chairman, Window & Store Display Committee, Residential Gas Section at A.G.A. headquarters.

LOOK WHO'S COOKIN'

Southern California Gas Co. Teaches the Youngsters to do their Wartime Stint at the Gas Range.

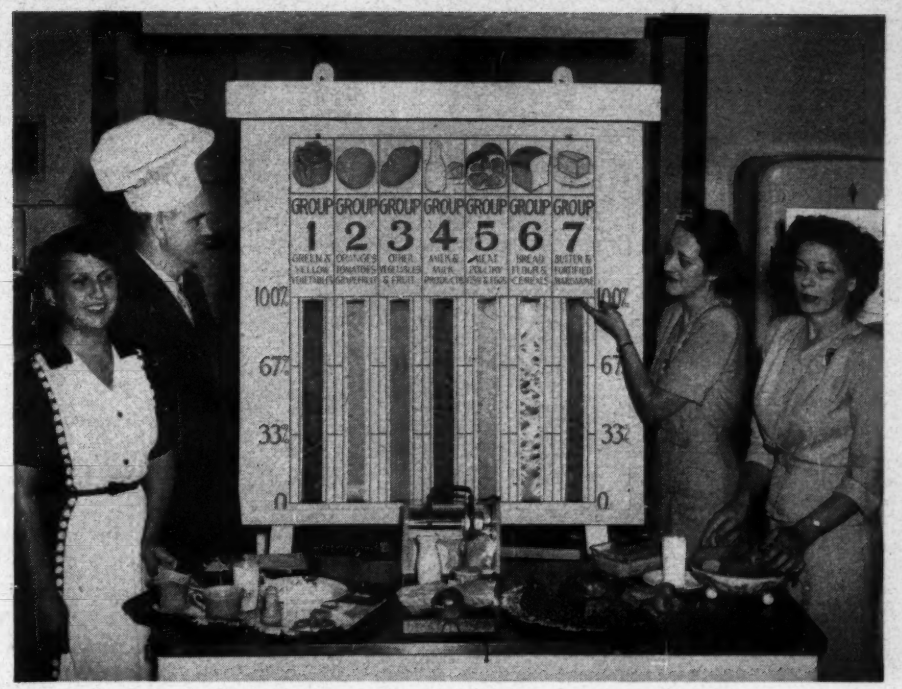
Mercedes Bates
Home Service Director

"LOOK WHO'S COOKIN'"—A Wartime Cooking Course for Young America—produced by the Commercial Sales and Home Service departments of Southern California Gas Co., is now in its *second-season* run before high school audiences.

With two casts booked solid for the 1944-45 Fall-Winter months, this miniature nutrition-gas cookery road show is now a veteran, having behind it a successful spring season in 22 schools—playing before 23,000 delighted students.

The show shaped itself about the need of the younger generation to know about Nutrition, with a capital N, since many a Southern California youngster found herself, or himself, suddenly playing the role of chief cook and bottle washer at home. Look Who's Cookin' was devised to provide these young ones with a short, short nutrition-cookery course built around the basic seven foods. It was approved by school authorities, and the program was on its way.

This course is a two-day event. On the first day *breakfast* is dramatized. *Box lunches* and *dinner* are second-day headliners. The script is from the combined pens of Home Service department members. The dialogue, handled expertly by extremely well-rehearsed players, sparkles; the action is fast—there's no dallying about putting foods on to cook; lots of "props"—from a string of eggs to fake glasses of orange juice and collapsible lunch boxes—entertain as well as educate. As a finale, a chart check-up is made to ascertain the nutrient value of the meals planned and recommended in the two-day school. It always adds up 100%. From Look Who's Cookin', students learn how important a well-balanced diet is to health, beauty and that feeling of well-being. The interesting demonstrations show how to develop a cooking technique that minimizes loss of fugitive and delicate vitamins.



FINAL DISPLAY: At the end of the two-day nutrition course, the nutrient values of the foods prepared and recommended are scored on the food chart—and it comes out 100%. On the table are displayed a good breakfast, box lunch and dinner. These meals were prepared on the stage to show students the technique of vitamin-saving cookery. From left to right the "Look Who's Cookin'" players are Esther Day, D. C. McLeary, Corris Guy, and Peggy Martin.

The two casts are made up of Home Service Department members: Corris Guy, Esther Day, Peggy Martin, Sybel Morris, Christabel Anderson, Eleanor Heilman and Kathleen Sutton. D. C. McLeary and Leo Shibley of the Domestic Sales Department do the m. c.-ing and double as comedians to answer the cry of the home economists — "Where's Mac? — Where's Leo?"

On the second day of the "Look Who's Cookin'" school the big surprise comes when D. C. McLeary decides to make a salad with fresh-from-the-Victory-garden vegetables.

The effects of the course are noted with interest: School cafeteria managers report that after a Look Who's Cookin' session the demands for milk and salads sky-rocket. Boys make no bones about asking for recipes for cinnamon rolls. One lad, sent to the superintendent to be excused for being late, was reluctant to give the reason why. When pressed, he admitted it took him longer to make the rolls that morning than he expected. P. S. He was excused! Another school cafeteria reported a "clean out" after the nutrition school, with milk consumption again taking a notable swing upward.

So that the course will not be forgotten too soon, a special manual with the same title, and written by Dorothy Schwarz, is distributed among all students attending the course. It's a colorful little book and generously illustrated with cartoons. It has a wartime flavor; is exceedingly readable and is filled with not-too-difficult recipes. It, too, takes credit in making the Look Who's Cookin' course a high success.

POSTWAR NOTES and NOTIONS

By STANLEY JENKS

Summer Valley

One look at the annual load curves of both the manufactured and natural gas industries in the Annual Supplement of the A.G.A. Monthly Supplement of Gas Company Statistics is enough to convince anybody of the need for an added large summer load. It is urgent in the natural gas industry, and mandatory in the manufactured gas field, if the latter is to solve successfully its economic problems, preëminent among which is a far better annual load factor for its manufacturing facilities. The following table, compiled from the A.G.A. statistical Annual Supplement, tells the story of the seasonal gap definitely ascribable to the househeating load.

			Sales MCF		
	1939	1940	1941	1942	1943
Househeating					
Monthly Min.	727,500	903,100	1,0 1,600	1,299,800	1,412,700
Monthly Max.	8,476,400	10,525,500	10,397,800	13,174,700	12,952,600
Range	7,748,900	9,617,400	9,326,200	11,874,900	11,539,900
Total					
Monthly Min.	23,588,500	24,469,000	26,198,100	28,605,800	30,887,700
Monthly Max.	33,653,000	36,968,300	38,591,000	44,578,700	46,502,700
Range	10,064,500	12,517,300	12,392,900	15,972,900	15,615,000

In 1939, the last pre-war year, you will note that the househeating load was responsible for 77.0% of the seasonal gap, compared with 74.0% in 1943. The proportion would undoubtedly be even higher without the inflated wartime industrial load included in the 1943 grand total.

The summer usage of gas must be boosted. In view of our admittedly economic advantages, air-conditioning is our big opportunity.

Down to Cases

At last, there is definite evidence that the seeds of our post-war planning arguments, discussions, and dreams are going to bloom and bear fruit. I refer specifically to the final report of the Pacific Coast Gas Association's committee on post-war domestic appliances submitted to the Committee for Gas industry Development. High lights on this report, prepared under the chairmanship of W. M. Jacobs, were presented in the October issue of GAS, and it made good reading, to be sure, for those of us who have been anxiously awaiting concrete proposals from a responsible utility group on what the gas utility wants from its appliance manufacturers.

Right off the bat, it can be stated categorically that our appliance manufacturers are able to furnish the gas industry any appliance it is blooming well prepared to pay for. That element of paying for value received has been one of our major snags in appliance development in the past. We were just too darned cheap-minded, to put it bluntly. For example, the *cost opposition* in many key utility circles to the CP range still rankles. Are we going to repeat, or rather perpetuate, this pinch-penny appliance purchasing, or are we going to take a lesson in salesmanship from the electric boys, who never let a price disadvantage in the range or automatic water heater field faze them in their promotion efforts?

After all, if our fuel service is really better and more economical, why do we need an initial price advantage, especially if it is stifling the research in design and utilization which is so all-important for our future development?

An Advantage

My friend (the gambling one) tells me it is most important when playing poker to know what the other fellow *hasn't* got. I thought of this when lunching recently with one of our top ranking sales executives in the so-called combination utility field. Naturally, we were talking shop. As a matter of fact, we were speculating on the future of the gas industry in the face of the inevitable competition it must face when the piping days of peace dawn again.

Mind you, a combination utility executive said it. I merely echo his words. *"The gas industry has every advantage, especially in the North, when it comes to central air-conditioning,"* he said. And he knows, because his company has just completed a very detailed study of the load economics involved. I didn't push him for figures, but from what he said, it was apparent that his company had concluded that the electric investment to take on the complete air-conditioning load was going to be too high to make it profitable.

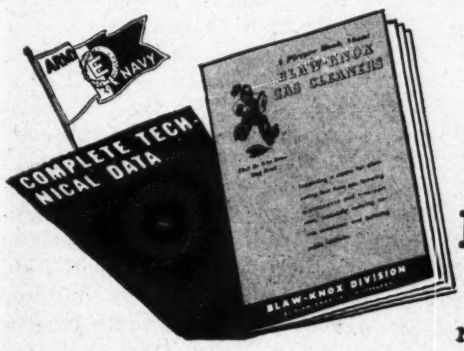
My combination friend said that he felt the electric utility ought to be tickled to death to settle for the fan load on a gas air-conditioning system, thereby corroborating a thought expressed on this page in October, when I wrote, "We might even see the day when competing straight gas and electric companies are promoting the same air-conditioning equipment."

There are very able combination men on the A.G.A. Post-war Planning Committee. Can we look to them for the facts and figures? For it is most important that the gas industry know exactly where it stands—if the electric boys *don't* have a full house in this new field—before we start laying out the chips.

BLAW-KNOX GAS CLEANERS Protect

PROTECT fine compressor stations. This battery of four Blaw-Knox Gas Cleaners is one of the first installations made on a line which now has thirty-three Blaw-Knox Gas Cleaners. They are protecting the most heavily loaded long transmission lines in the United States.

BLAW-KNOX GAS CLEANERS remove pipe line dust easily and efficiently. Their effective operation is thoroughly described and illustrated in Blaw-Knox Catalog No. 1869, a copy of which will be sent to you upon request.



BLAW-KNOX DIVISION
of Blaw-Knox Company
2033 FARMERS BANK BUILDING • PITTSBURGH, PA.
NEW YORK · CHICAGO · BIRMINGHAM · PHILADELPHIA · WASHINGTON

TRENDS AND COMMENT

Electric Hour Moves

"The Electric Hour," that radio program sponsored by the electric utilities which stars Nelson Eddy, has moved into the choice Sunday spot (4:30-5 p. m. EWT) vacated by the discontinuance of Coca-Cola's "The Pause That Refreshes on the Air." The show, which was formerly heard on Wednesday, 10:30-11 p. m. EWT, can be heard at the new time on December 17 over the full CBS network.

Dresser Expands on Coast

The rumor was out, as G A S goes to press, that the $35,000,000 Dresser Industries, Inc., would buy three California manufacturing concerns in the Los Angeles area: Pavne Furnace & Supply Co., Bevery Hills; Day and Night Manufacturing Co., Monrovia; Kobe, Inc., Huntington Park.

In line with its expansion program, Dresser headquarters will move from Bradford, Pa. to Cleveland, according to President H. N. Mallon.

Other Dresser companies include Clark Bros. Co., Inc., Olean, N. Y.; Pacific Pumps, Inc., Huntington Park, Calif.; International Derrick & Equipment Co., Columbus, Delaware and Marietta, O., Beaumont, Texas, and Torrance, Calif.; Roots-Connersville Blower Corp.; Connersville, Ind.; Stacey Bros. Gas Construction Co., Cincinnati, O.; Bovaird & Seyfang Mfg. Co., Bradford, Pa.; and Dresser Manufacturing Co., Ltd., Toronto, Ont.

Industrial Training Films

A recent issue of *Sales Management* outlines some practical notes for beginners in the use of industrial films. Peace will bring back to civilian life several million men and women conditioned to giving and receiving impressions through motion pictures, many of them highly conscious of the value of saving time by the use of films, says the article. Use of films is claimed to have cut the time of training the armed forces by 60%.

As to costs the article states that "roughly a slide film can be produced for as little as $100, or as much as $3500, the latter figure covering the cost of top-notch 100-frame presentation with record for sound. Motion picture costs vary more widely, the greatest number falling somewhere between $3000 and $40,000, though these are by no means the extremes."

Clifford Johnstone recently wrote us "that one of the most important things nowadays is the training of new employees." No doubt films will play an increasingly important part in this work.

Surveys

In a customer preference survey on postwar residential heating conducted by *Practical Builder*, a Chicago publication, polling 5000 building contractors in 29 states, gas turned out to be the favorite fuel in all sections of the country except New England, where oil has the edge. The answers to other questions stress the fact that the builder is the key man in the selection of the heating plant, more so than the architect, the consumer or the heating contractor. Forced air is largely preferred although in California gravity warm air is a close second.

A reader survey by *House and Garden* reveals that 45 out of 100 will build or buy new homes after the war. The average house will have 7.5 rooms to cost $12,928. This is evidently a "class" group. Only 8% are considering pre-fabs; 54% want traditional designs; nearly 40% are thinking of radiant heat, and 62% want air cooling; 30% now have gas for heating, and 35% want it in their new homes. All other heating fuels slip a bit except electricity which goes from nothing to 3%.

For cooking fuel it is gas that slips —74% use gas now and 44% plan to continue. This compares with 23% who now use electricity and 47% who want it in the new homes.

It is expected that about 400,000 new homes may be built in 1945, according to the War Production Board estimates. This is compared with 225,000 new homes built this year, and 250,000 in 1943.

Disabled Veterans

We think the Rheem Manufacturing Co. is on the right track. They not only want to help rehabilitate and reemploy the disabled American veteran, but they have a plan for doing so.

President R. S. Rheem says that the disabled veteran can be fitted into the pattern of production after the war as a full-fledged worker at proper wages. The secret: to fit the machines to the men, not the men to the machines. Could a foot treadle be substituted for a hand lever to suit a one-armed man? Could the operator be seated rather than stand? Could a man with partial deafness be used, and where? What jobs could be done with a worker with one eye?

Rheem, which has 15 plants (nation's largest manufacturer of automatic water heaters and steel shipping containers), has just completed a full study at its South Gate, Calif. plant. This revealed that 51% of its total positions could be filled by handicapped persons. There are jobs for one-armed workers, workers with partial limitation in one hand, one-legged workers, blind workers, deaf mutes, workers with nervous instability or poor coordination, sensitive skin or respiratory ills.

Of course, it goes without saying that the disabled veteran must have special understanding and careful handling. Hhe must return to industry as a contributor on merit, not as the recipient of "charitable" employment.

"The disabled war veteran," said Mr. Rheem, "is entitled to be fitted into the pattern of American production. American Industry, by preparing now, can see that he does fit in."

We would put it a little stronger—we would say that it is Industry's solemn responsibility to make a place for any disabled veteran who earnestly seeks to make himself useful.

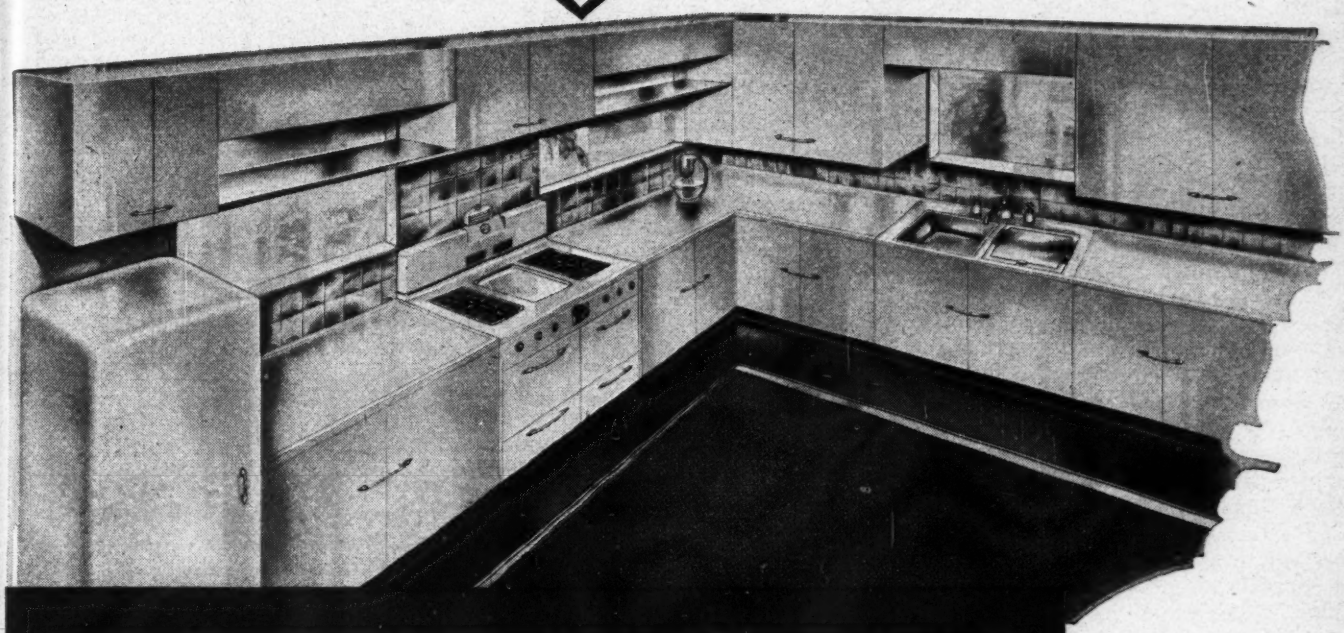
In-Plant Feeding

After we have spent a busy morning laying plans to get ready to devote the afternoon to making a pile of the matters we are going to put off until tomorrow, we are faced with the necessity for making a decision. Where to eat?

We have experimented in all directions and wish to lay down the formula that the excellence of the food decreases in geometric ratio with the proximity of the beanery to the desk. We have become a young man with an old stomach.

This brings us to the topic—in-plant feeding. Ours is a small office in a large building, and it occurs to us that the gas utilities might work more closely with building managements in establishing "in-building" feeding, especially in overcrowded districts or where the local hash shops need a little competitive prodding. No doubt many large buildings throughout the country have facilities

Magic Chef Ranges... the **HEART** *of modern gas kitchens . . . . .*



Kitchens like this . . .

will help sell Gas Appliances

We're not selling complete kitchens. But here is an idea for the kind of postwar kitchen that millions of home-makers are dreaming of. It's a practical dream kitchen that can come true just as soon as appliances are again available. It's the type of kitchen that will help you make future sales of gas appliances.

The heart of this kitchen is a Magic Chef gas range —the range that's preferred by American home-makers. This preference, built by many years of unparalleled performance and consistent national advertising, has made Magic Chef the magic name in ranges.

Magic Chef advertising in leading national magazines is working for you month by month. It's maintaining Magic Chef's outstanding preference and paving the way for sales in the future.

AMERICAN STOVE COMPANY

4901 Perkins Avenue • Cleveland, Ohio

NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO
ST. LOUIS • ATLANTA • LOS ANGELES

CP

Specify a Magic Chef CP Gas Range

Magic Chef

RED WHEEL GAS RANGES AND HEAVY DUTY GAS COOKING EQUIPMENT

Awarded to Quick Meal Stove Co. Division of American Stove Co.

of this sort, but we know of a number of pleasant and sunny roof-tops that are going to waste.

Our latest information on in-plant feeding is gleaned from the *Wall Street Journal*, which comments on a recent nationwide survey made by the War Food Administration. Five million workers in about half the manufacturing plants in war work now obtain mid-shift meals on the job. Another 500,000 in other manufacturing industries have access to food on the job. Expansion of existing facilities now being planned will provide in-plant food service for an additional 1,500,000 workers.

Industrial feeding has been most extensively developed in large plants with 91% of the plants having more than 2500, and 80% of those employing from 1000 to 2500 workers having some type of in-plant feeding facilities. The larger plants, too, are quicker to expand existing service. Among small plants, however, only 28% have food services.

While great strides have been made in in-plant feeding, less than half of the existing facilities are adequate, according to the WFA survey. This conclusion is based upon field reports and the survey results, which show that only 44% of the plants with food facilities are serving 60% or more of their workers.

Memphis Order Reversed

THE Federal Power Commission on Nov. 22 issued certificates to the Memphis Natural Gas Co. authorizing the construction and operation of additional facilities to serve the company's customers in Arkansas, Mississippi, and Louisiana.

The November order reverses FPC's decision of June 10, 1944, under which the application was dismissed without prejudice, one of the Commission's principal reasons for denial being that in view of the applicant's limited reserves, it was necessary to conserve their natural gas reserves for *domestic, commercial, and superior industrial uses.*

This use of a new standard in judging the validity of natural gas applications created wide concern throughout the industry, causing one spokesman, R. E. Wertz, president of Amarillo Gas Co. to state in a Guest Editorial published in the July issue of GAS:

> "It becomes increasingly apparent that a new and untried factor is to be added to the orthodox utility formula for regulation of the natural gas industry. In addition to approved rates and other terms and conditions of service, the ultimate use to which the gas is to be applied must be of sufficient quality to pass a test of 'superiority.' . . .
>
> "Any successful program to conserve gas for superior uses will require a high degree of cooperation, not only on the part of national and state regulatory bodies but by producers, pipeliners and consumers as well. Otherwise, the intended service in the public interest may well turn out to be a distinct disservice. Above all, a constructive solution of the problem will require a thorough understanding of its magnitude before undertaking any program."

To further strengthen its position in granting or withholding certificates on the basis of end uses to which natural gas transported is likely to be put, FPC on Sept. 22 instituted a comprehensive investigation of the entire problem of natural gas reserves, their preservation and ultimate use. This action by FPC was critically appraised by Elliott Taylor, Washington Editor of GAS, in an editorial, "Plunge for Power," published on page 9 of the November issue.

The Commission's release of Nov. 22 makes no reference to "end" uses, but merely states that the application has been granted because of agreements between Memphis Natural and United Gas Pipe Line Co. and Southwest Gas Producing Co., which assure additional reserves from fields other than the Monroe field in Ouachita Parish, La., from which Memphis now draws its entire natural gas supply. According to testimony at the hearing, recoverable reserves in the Monroe field are equivalent to not more than 8 years supply at recent rates of production.

The facilities to be constructed by Memphis Natural at a total cost of $2,253,000 include:

1. A 20-in. 49½-mile line from the North Lisbon gas field in Claiborne Parish, La. to the company's Guthrie Compressor station in the Monroe field. Cost: $1,440,000.

2. Three 18-in. lines, aggregating 61½ miles, paralleling the unlooped portion of the company's existing main transmission line in Arkansas and Missippi. Cost: $1,113,000.

Under the Commission's order, construction must start not later than December 15, and the facilities are not to be used for the transportation and sale of gas to new customers of either Memphis Natural or United Gas Pipe Line Co. without specific FPC authorization.

Memphis proposes to continue in

Endogas Toughens Metal Parts of War Machines

This glowing furnace contains Endogas, a mixture developed in the laboratories of the Westinghouse Electric and Manufacturing Co., to toughen metal parts for war machines and equipment. Endogas is made by mixing air with quantities of ordinary illuminating gas, either manufactured or natural, and heating it in a specially-designed electric furnace called a gas generator. From the generator Endogas is piped into the heat-treating furnace.

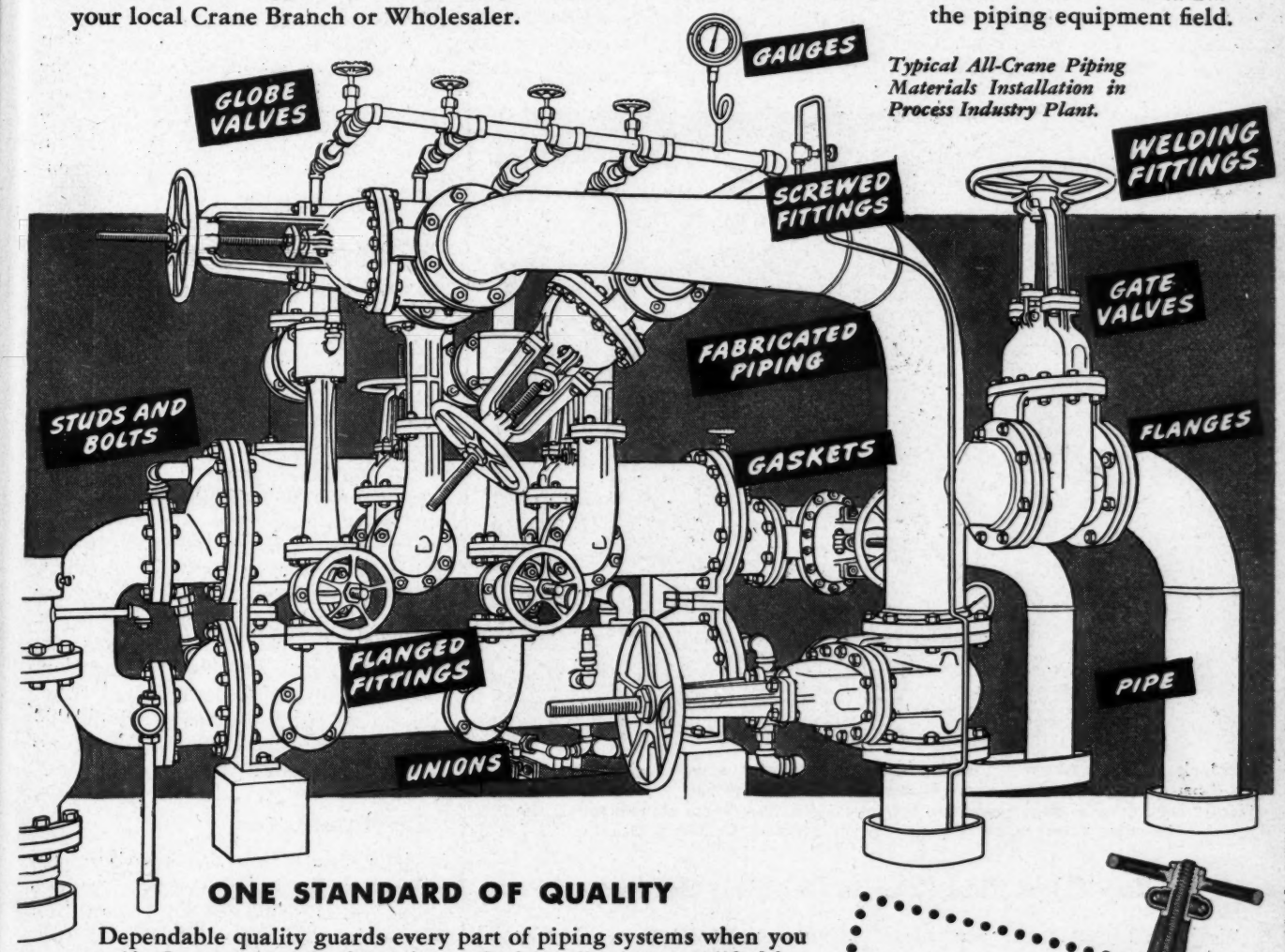
Endogas acts as a sentry in keeping carbon—steel's hardening element—imprisoned inside the metal while it is being heat-treated. Steel parts for airplane engines are now toughened to last at least twice their former life expectancy by treating them in furnaces containing this inexpensive protective atmosphere. Here J. L. Fisher, research engineer at the Westinghouse Laboratories, places a set of Dieselelectric locomotive pinions in the furnace.

Piping Materials for Any Need ...Crane Can Supply Them

ONE SOURCE OF SUPPLY . . . ONE RESPONSIBILITY FOR ALL EQUIPMENT

The easiest way to dispose of piping supply problems is to put them up to Crane. Doing that gives you the world's greatest selection of equipment for every service—power or processing systems, high or low working pressures. All your needs of valves, fittings, pipe, fabricated assemblies and piping accessories are supplied from one single source—your local Crane Branch or Wholesaler.

Now when you are trying to catch up with deferred maintenance, Crane *complete* piping materials service is a big advantage. From ordering to installation, every step of the job is simplified. And while one responsibility for materials helps assure the best installations, you are also getting full benefit of Crane Co.'s 89-year experience and leadership in the piping equipment field.



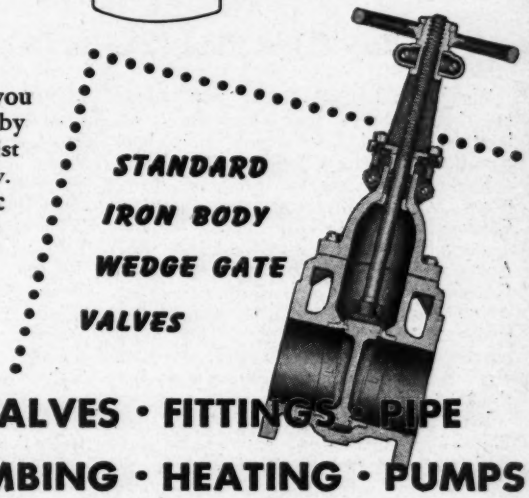
Typical All-Crane Piping Materials Installation in Process Industry Plant.

ONE STANDARD OF QUALITY

Dependable quality guards every part of piping systems when you specify Crane materials throughout. Such quality is exemplified by Crane Iron Body Wedge Gate Valves. Strong body sections resist severest strains. Straight-through ports permit unrestricted flow. A deep stuffing box lengthens packing life. Long guides keep disc travel true, while the finest design in every part assures long life and smooth, trouble-free service.

Crane Co., General Offices: 836 S. Michigan, Chicago 5, Ill.

Branches and Wholesalers Serving All Industrial Areas



CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

effect its present rates. The main line loops would provide a daily delivery capacity of 153,000 Mcf to meet an estimated 167,050 Mcf peak day demand. The deficiency, according to the FPC opinion, can be taken care of by customers' standby-fuel equipment.

Tappan Plans Expansion

KEEPING in step with various government rulings which will allow partial reconversion to civilian production and foreseeing an early end of the European war, officials, engineers, development technicians and research men of the Tappan Stove Company are planning for a postwar expansion program with the prospects of doubling production and manufacturing a finer postwar gas range.

Included in the postwar program is an expansion project that will cost close to a million dollars with possibility of branching out into other production lines. Although the developments of "other lines" are in their embroyonic stage, they remain a company secret, according to W. Hubert Tappan, vice president of the company.

Tappan officials believe there are many improvements to be made in ranges and kitchen equipment to lighten the burdens of the housewife. The company's development department is working on some of them now. One is a means of providing better kitchen ventilation and eliminating the obnoxious odors that accompany the preparation of some foods, such as cabbage, onions and cauliflower.

New ideas of postwar improvements and postwar projects are submitted to an executive board of four members headed by the Tappan vice president. If approved by that group, they are passed on to a larger advisory group for study and then to the firm's engineers for specifications and to artists who draw sketches of the proposed items. A wooden model is then made to show up weaknesses before actual production gets underway.

These ideas are tested in the Tappan experimental kitchen under the able supervision of Miss Florence Windecker, home service director.

A dealer distribution policy that went into effect shortly before the attack on Pearl Harbor will be extended by Tappan to include the early period of postwar range production, according to C. V. McConnell, general sales manager.

Principals in the Southern California Canning Contest for school students were Mrs. Iris Albert, superintendent of home economics, Los Angeles city schools; Joan Leslie, Warner Bros. actress; Mrs. Alexander Kerr, president, Kerr Glass Manufacturing Corp.; Mercedes Bates, home service director, Southern California Gas Co.

Boy Takes First Prize in Canning Contest

The age-old male belief that "men are better cooks than women—or at least as good," was proven true, last month, in the related field of canning.

The occasion was the presentation of prizes, at the auditorium of the Southern California Gas Co., Los Angeles, for the canning contest sponsored by the Los Angeles School System, the Kerr Glass Co., and the Southern California Gas Co., which was opened to both junior and senior high school students. The adage prover was Jim Mason, John Marshall High School athlete and actor, who won the $100 first prize for the senior group.

Some 39 schools participated and 351 jars of produce were entered by 117 students. Judges were Marian Manners, Los Angeles Times Home Economist; Prudence Penny, Los Angeles Examiner; Ann Martin, Los Angeles Bureau of Power and Light; and Mercedes Bates, Southern California Gas Co. Prizes ranged from the first prizes of $100.00 down to a dozen Kerr jars.

Presentation program was under the direction of Mrs. Iris Albert, supervisor Home Economics Department, Los Angeles City Schools, and Joan Leslie, Warner Brothers motion picture star, presented the prizes to ten other senior high school students beside Jim Mason, and 10 junior high school students, with Barbara Tremblay, Mt. Vernon Junior High School, winning the $100 prize for the junior group.

Michigan Tax Case

The Michigan court decision in the Detroit Edison case does not mean that utility rates should be cut by an amount absorbing all excess profits tax liability, according to an interpretation by Chairman Shilson of the Michigan commission.

In the meantime, according to press reports, the state public service commission has ordered Michigan Consolidated Gas Co. to reduce December bills to consumers by 31%, eliminating an estimated $1,000,000 charge for Federal excess profits taxes. Previously Detroit Edison was ordered to rebate $10,450,000, and Consumers Power Co. to reduce December bills 75%, eliminating $4,000,000 of an estimated $5,000,000 excess profits tax liability.

Pipelines

The Southern California-Southern Counties La Goleta to Los Angeles pipeline is scheduled for completion December 15. The $4,000,000 project will provide a net increase of 164,000,000 cu. ft. for peak day use by essential customers.

United Light & Power Co., which at present serves the industrial district of Detroit with natural gas obtained under contract with Panhandle Eastern Pipe Line Co., plans construction of a $70,000,000 line to tap the Hugoton field in Kansas and Oklahoma for gas to supply to distributing subsidiaries at Detroit, Milwaukee, and Madison, Wis. and to certain Iowa and Illinois cities en route.

Put it to work for you

This Attractive GAS KITCHEN Booklet

Here is a new booklet about the use of gas, the ideal fuel—an interesting, attractive booklet that commands attention and presents a powerful message that will have widespread favorable reaction with every reader.

It creates a desire for gas cooking, gas refrigeration, gas water heating, gas home heating, gas air conditioning. Emphasis is concentrated on six smartly designed kitchens in full color.

Order a free sample copy of this booklet. Learn how it can be used effectively with prospects, architects, builders, building and loan associations, apartment house owners and others in your community. It packs a punch that will pave the way for even more enthusiastic acceptance of gas appliances in the days ahead.

GAS

ROPER
GAS RANGES

GEO. D. ROPER CORPORATION, Rockford, Illinois, manufacturer of ROPER, "America's Finest Gas Range," for all gases including L.P. (Liquefied Petroleum) gas.

Offices and Warehouses in Atlanta—Chicago—Cleveland—Dallas—Denver—Los Angeles—Oakland—Philadelphia

Looking ahead, the P. C. G. A. has brought post-war problems into sharp focus. For many months, committees have worked to prepare the gas industry of the West for V-day and years to follow. ★

COMMITTEE ON APPLIANCES

Combining utility and manufacturer membership, the Post-war Appliance Committee has conducted contests and surveys that have brought out scores of ideas and suggestions. It has also sent comprehensive reports to manufacturers, suggesting lines of research for improvement of existing appliances, for the creation of new ones.

***Other* COMMITTEES ACTIVE**

The Committee on Sales Training and the Personnel Committee also have slanted their programs towards the peace-time future. ★ The keynote is . . . *planned preparedness.*

GAS FUEL

SERVING THE WEST IN WAR AND PEACE

THE PACIFIC COAST GAS ASSOCIATION

Laboratories Open Temporary Offices

TEMPORARY offices have been established by the American Gas Association Testing Laboratories for the purpose of carrying on following the devastating Cleveland fire which resulted in severe damage to the Laboratories and injuries to eight employees and five visiting manufacturers who were burned while escaping from the fire-swept area.

The fire, which spread to the Laboratories in a matter of a very few seconds, completely gutted all offices and destroyed almost all records and research data with the exception of some testing and inspection files which while charred, are still usable. The intense heat penetrating the building before the fire reached it, together with alarms spread by a number of members of the staff, fortunately gave sufficient warning to enable every person to leave the Laboratories without injury. Those burned were among the first to leave and apparently suffered from the effects of radiant heat in the street while making their escape from the devastated area. Contrary to an early report no explosion occurred in the Laboratories at any time, and no fire originated on their premises.

Three women scientists, Virginia Bover, Marjorie Gast, and Elizabeth Myers were among the injured employees. Others were E. J. Abbott, Herman Benditz, John J. Matter, J. B. Morton, and T. W. Patterson. The manufacturers burned were Marius Marranese of The W. J. Schoenberger Co., Leslie Vixler of The Patrol Valve Co., Earl Hillebrand of the Florence Stove Co., J. C. Scherrer of The Security Manufacturing Co., and George Reznor of The Reznor Manufacturing Co.

While the second floor offices suffered the most, other sections of the building and its equipment were also badly damaged. Loss of records and need for checking equipment including miles of piping will require considerable time before research and testing activities can be resumed on a normal basis. Operations connected with the production of automatic oxygen regulators for the Army Air Forces are being given top priority in scheduling resumption of work due to the urgency of this war contract.

Plans to expedite restoration of testing activities as quickly as possible are being formulated. Determination of the full extent of losses and making of necessary building repairs will require time. A substantial part of the testing equipment was apparently undamaged except for the effects of smoke and water. The majority of appliances were not seriously damaged although a large number of accessories, awaiting test, were destroyed.

The substantial and fireproof construction of the Laboratories was not only responsible for keeping it from being completely destroyed but was instrumental in saving surrounding buildings and homes on two sides. These remained practically intact except for broken windows. The Laboratories' four gas holders likewise withstood the fire with little damage.

Temporary offices in the Research Laboratory of the American Society of Heating and Ventilating Engineers were obtained through the generosity of that organization which immediately offered the use of its premises until such time as the Laboratories could be fully re-established. They are located at 10700 Euclid Avenue, Cleveland 6, Ohio. The telephone number is "Randolph 9301".

Laboratories Publishes New Air Conditioning Data

A study of three specific phases of gas air conditioning and related subjects, including an extensive field investigation, has been completed by the American Gas Association Testing Laboratories. The study represents a year's work under sponsorship of the Joint Committee on Gas Summer Air Conditioning of the Industrial and Commercial Gas Section and the Residential Gas Section.

Two of the phases, performance of air duct systems for all-year air conditioning installations and a field survey of water problems encountered, have been published and distributed to the gas industry. In the air duct survey contemporary methods of computing pressure loss and data employed were found inadequate for calculating this factor in all types of duct system fittings and will require additional research for solution. Water problems were found to differ in various geographical areas and the survey indicates that in many locations need exists for water treatment of some kind. Solution of the problem in any specific area may require consultation with water treatment engineers.

The third phase surveyed, the need for control of dehumidification in addition to cooling, is to be published soon. This study indicates that in certain localities there is a necessity for better control of dehumidification and that this problem is also local in character. Available weather data for specific areas and methods of estimating local design conditions are also included.

New Agency for AGAEM

The Association of Gas Appliance and Equipment Manufacturers has just placed its account with Hill Advertising, Inc., 250 Park Ave., New York 17.

YOUR POSTWAR CUSTOMERS WILL WANT WARMTH *PLUS*

Steady temperature, good circulation, cleanliness, safety, convenience, and economy are all features your customers will demand in their postwar furnaces. You may assure them of getting all these advantages in the Ward Floor Furnace. For Ward has incorporated all its 35 years of experience into designing more efficient heating equipment for your postwar selling program.

WARD HEATER COMPANY

1800 W. WASHINGTON BLVD.
LOS ANGELES 7, CALIF.

ASSOCIATIONS

Hazard Elimination Sought By Oklahoma Group

Elimination of hazardous conditions which have resulted from hasty war housing construction in some sections of the state is being sought by the safety appliance committee of the Oklahoma Utilities Association, headed by Carl Dean, heating and air conditioning engineer of the Oklahoma Natural Gas Co., Tulsa Okla. Dean's committee was appointed at the March, 1944 annual meeting of the Oklahoma Utilities Association. The movement grew out of a paper read by Dean before that meeting on the subject "There Ought to be a Law", in which he outlined some of the hazards, such as elimination of central flues in many small housing units and installation of improperly vented floor furnaces.

This committee, for some time has been working with the Oklahoma Department of Health and the State Fire Inspection Bureau on a proposal to amend present regulations of these agencies so as to insure stricter compliance with safety and health rules in smaller homes, tourist camps and other buildings where central heating systems ordinarily are not installed and where installation of improperly vented gas appliances is most likely to occur.

National Appliance Surveys Distributed by AGA

The AGA has distributed two parts of the national appliance survey conducted by the subcommittee on new and improved postwar gas appliances. Report No. 1 covers gas ranges and coordinated kitchens, and Report No. 2 gas refrigerators.

Each report is a tabulation of replies summarizing the opinions of gas companies on improvements most needed in postwar gas appliances, the report on gas ranges representing 81.3 per cent of the total gas meters in the United States and that on refrigerators, 79.9 per cent. Results of the surcey have been tabulated on both a national and regional basis.

The study indicates that on certain questions there is complete agreement, and on others a wide divergence of views. There has been no attempt to draw conclusions from the reports.

F. M. Rosenkrans, new business manager, The Gas Service Co., Kansas City, is chairman of the subcommittee in charge of the survey.

Engineering Group To Meet

The annual technical meeting of the Louisiana Engineering Society will be held in New Orleans, at the St. Charles Hotel, Jan. 11-13, 1945. Charles Kerr is president of the Society; Stone Leake, General Electric Co., is convention chairman.

The Mid-Year Meeting of the Board of Directors will be held in New Orleans, La., April 9, 10, and 11, 1945. The Annual Membership Meeting will be held October 15, 16, and 17, 1945, with the site of the meeting to be determined later.

CALENDAR

April

American Gas Association 22nd Annual Distribution Conference—Stevens Hotel, Chicago, Ill., April 4, 5, and 6. 1945.

American Gas Association 5th Annual Conference on the Operation of Public Utility Motor Vehicles—Stevens Hotel, Chicago, Ill., April 4, 5, and 6, 1945.

June

American Gas Association 18th Annual Joint Conference of the Production and Chemical Committees — Hotel Pennsylvania, New York City, June 4, 5, and 6, 1945.

Personnel Group Formed

Representatives of gas companies met at Kansas City, Missouri, Oct. 25, for the organizing of an American Gas Association Midwest Personnel Conference covering the states of Iowa, Nebraska, Kansas, Missouri, and Arkansas. R. B. Harkins, personnel director, Panhandle Eastern Pipe Line Co., Kansas City, Mo., was chosen chairman of the Conference for the ensuing year.

The purpose of the Conference is to give gas companies an opportunity to discuss industrial relations problems, review and exchange practices, postwar personnel planning including the handling of returning veterans, etc. No formal programs are planned and the meetings will be devoted to discussion of the more vital personnel matters in light of actual experience of the gas companies represented. The Conference also will be available to handle any necessary regional personnel matter.

Regular Meeting Executive Board, American Gas Association, New York City, September 13, 1944: SEATED LEFT TO RIGHT: **R. G. Barnett,** Portland (Ore.) Gas & Coke Co.; **Marcy L. Sperry,** Washington (D. C.) Gas Light Co.; **Alexander Forward,** managing director, A.G.A.; **Ernest R. Acker,** president A.G.A.; **J. French Robinson,** vice president A.G.A.; **D A. Hulcy,** Lone Star Gas Co.; **Walter C. Beckjord,** Columbia Gas & Electric Corp.; **George S. Hawley,** The Bridgeport Gas Light Co., Bridgeport, Conn.
STANDING LEFT TO RIGHT: **Kurwin R. Boyes,** secretary, A.G.A.; **E. P. Noppel,** Ebasco Services, Inc.; **Charles A. Tattersall,** Niagara Hudson Power Corp.; **Harry K. Wrench,** Minneapolis Gas Light Co.; **John W. Batten,** Michigan Consolidated Gas Co.; **John W. West, Jr.,** Asst. to Managing Director, A.G.A.; **E. J. Tucker,** Consumers Gas Co., Toronto, Ont.; **F. M. Banks,** Southern California Gas Co.; **J. H. Warden,** Oklahoma Natural Gas Co.; **Alexander M. Beebee,** Rochester Gas & Electric Corp.; **R. M. Conner,** A.G.A. Laboratories; **D. W Harris,** Arkansas Natural Gas Corp.; **H Carl Wolf,** Atlanta Gas Light Co.; **H. Leigh Whitelaw,** AGAEM; **E. J. Boothby,** Washington (D. C.) Gas Light Co.; **H. R. Cook, Jr.,** Consolidated Gas, Electric Light & Power Co., Baltimore, Md.

ACCURACY

OF

GAS CONTROL

REYNOLDS GAS REGULATORS

AS ACCURATE AS A MICROMETER

● Reynolds Regulators insure accurate Gas Control. They will operate accurately either individually or in series, depending upon the conditions under which they operate . . . Long life, efficient operation, accurate regulation, reasonable cost, low upkeep—these are the vitally important inherent features built into REYNOLDS Gas Regulators through more than 50 years experience in developing, designing, building and testing Gas Control equipment . . . For complete cooperation of our Engineering Department, write our Factory, Branch Offices or Representatives.

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Boston Massachusetts

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No. 268 Park Street
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423 Dwight Bldg.
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2nd Unit,
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A.O. SMITH Smithway CORPORATION

Together WE SERVE!

THE BURKAY COMPANY, TOLEDO, OHIO, ANNOUNCES:
A. O. Smith Corporation takes over distribution and sales of the well-known Burkay Volume-Flow Gas Water Heaters . . . providing complete service second to none in commercial and industrial markets . . . a constructive contribution to public health and sanitation.

A. O. SMITH CORPORATION ANNOUNCES:
The addition of Burkay Gas Water Heaters to the nationally known SMITHway Gas Storage Water Heaters broadens our line and raises still higher the standards of SMITHway service. The Burkay Company and A. O. Smith Corporation henceforth serve together.

A. O. SMITH Corporation

Milwaukee 1, Wisconsin

New York Group Becomes First I. C. I. Chapter

The Air Conditioning Council of Western New York, according to an announcement by W. E. Voisinet, president, will become the first local chapter of Indoor Climate Institute. The formal induction ceremony was held at the Buffalo University Club the evening of Nov. 14. The name of the local organization will be changed to Indoor Climate Institute, Western New York Chapter.

Mr. Voisinet pointed out that the Air Conditioning Council of Western New York has been operating for eight years and has pioneered much of the same work that is being done by the Indoor Climate Institute.

P. B. Zimmerman, vice president of Chrysler Corp., Airtemp Division, and president of Indoor Climate Institute was the principal speaker at the Buffalo induction ceremonies.

I.C.I. is a non-profit, educational organization, composed of the leading manufacturers of heating, cooling and air conditioning equipment. Its primary function is to assist manufacturers and trade associations in the related industries, and contractors and dealers who handle equipment, in keeping the public informed as to the benefits of controlled indoor climate.

SCMA Meeting to Feature Manufacturers Displays

The Southern California Meter Association will devote its December 21st meeting at Rio Hondo Country Club to members who manufacture and sell equipment used in measurement and control. Several manufacturers plan to have equipment or models to display. Each representative will be given from five to 10 minutes for discussion and demonstration.

PCGA Issues Booklets On Sales Recommendations

The Pacific Coast Gas Association has recently mailed to company members and to individuals enrolled in the Sales Section, a booklet containing recommendations for general sales and advertising policies for the postwar gas industry. These recommendations were a part of the 1944 report of the Committee for Gas Industry Development. The booklet contains a foreword by H. L. Masser, chairman of that Committee, and an introduction by O. R. Doerr, chairman of the Sub-Committee which produced this section of the report. Extra copies are still available.

The section of the report dealing with recommendations for postwar gas appliances is also being printed in booklet form and will soon be available to company members and interested individuals. This section of the report was prepared by a committee headed by W. M. Jacobs.

IPA Meetings Set

Dates for the two regular meetings of the Independent Petroleum Association of America for the ensuing year have been set by the Executive Committee.

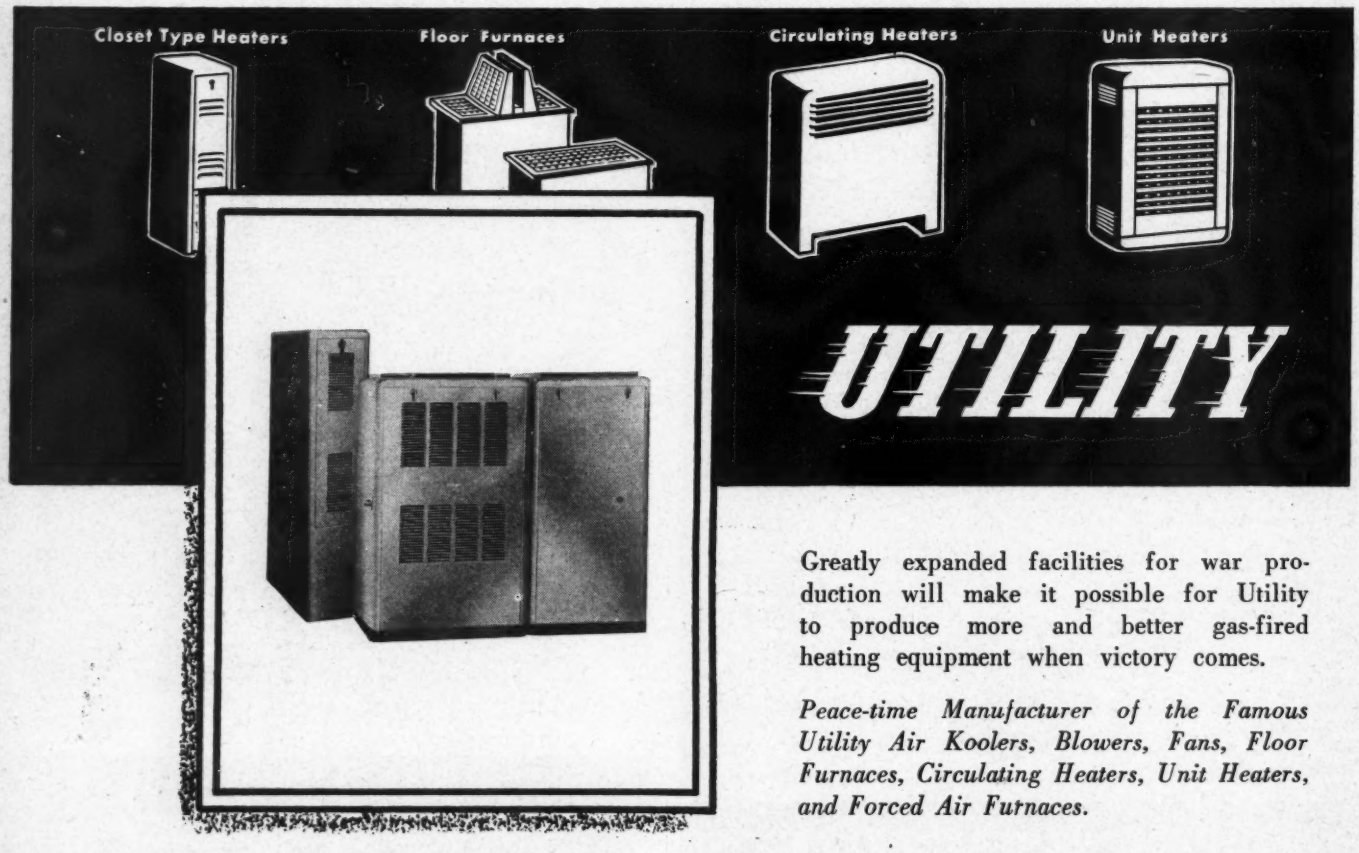
Committee Heads Named For 1945 Short Course

Preliminary arrangements for the 1945 Southwestern Gas Measurement Short Course, tentatively set to meet April 17, 18 and 19 at the University of Oklahoma, Norman, were made by the general committee in Dallas, Texas, November 10.

Earl Kightlinger, Arkansas-Louisiana Gas Co., Shreveport, La., chairman of the general committee, announced the following appointments as chairmen of sub-committees: C. A. Gibson, Cities Service Gas Co., Bartlesville, Okla., program committee; R. M. Scofield, Lone Star Gas Co., Dallas, exhibits committee; Miss Kate A. Niblack, Oklahoma Utilities Association, Oklahoma City, registration and publicity committee; Dean W. H. Carson, College of Engineering, University of Oklahoma, who is chairman of the executive committee, was elected chairman of the banquet, entertainment and local arrangements committee and W. H. Woods, Gulf Oil Corporation, Houston, Texas, to continue as chairman of the committee for the study of practical methods.

INGA Committee Named

E. Buddrus, Paul Kayser, and D. D. Harrington have been appointed by the Independent Natural Gas Association of America to a committee to express that Association's views before the Federal Power Commission's hearings on Nov. 28 on the recently ordered Natural Gas investigation.



Greatly expanded facilities for war production will make it possible for Utility to produce more and better gas-fired heating equipment when victory comes.

Peace-time Manufacturer of the Famous Utility Air Koolers, Blowers, Fans, Floor Furnaces, Circulating Heaters, Unit Heaters, and Forced Air Furnaces.

UTILITY FAN CORPORATION

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Sales Training Booklets Published by PCGA

The Pacific Coast Gas Association in cooperation with the California State Department of Education has developed a "Sales Training Program for Gas Appliance Dealers and Salesmen, Merchant Plumbers, and Distributors." The program is in the form of 14 booklets prepared by Ferris M. Wakeley, staff instructor, Bureau of Business Education, California State Department of Education.

Price for the complete set of 14 units is $2.50. Units ordered separately are 20c each. Titles of the 14 booklets are as follows:

Unit 1. Gas Information Manual for Salesmen.
Unit 2. The Science and the Art of Successful Selling.
Unit 3. What Makes People Buy Gas Appliances.
Unit 4. The Salesman and the Sale.
Unit 5. When Customers Call.
Unit 6. Prospecting Inside the Store.
Unit 7. Getting Business Outside the Store.
Unit 8. The Development and Use of a Prospect File.
Unit 9. Preparing to Make an Effective Sales Presentation.
Unit 10. Making an Effective Gas Range Presentation.
Unit 11. Making an Effective Presentation of Automatic Gas Water Heaters.
Unit 12. Making an Effective Gas Refrigerator Presentation.
Unit 13. Making an Effective Presentation of Gas Heating.
Unit 14. Types and Traits of Prospects.

Oklahoma Natural To Spend $1,500,000 in 1945

Construction and improvement projects to cost his company over $1,500,000 are planned for 1945, Joseph Bowes, president, Oklahoma Natural Gas Co., Tulsa, Okla., announces.

The improvements are being undertaken, not only to meet present requirements but in anticipation of development in the post-war era, Mr. Bowes said.

The program provides for production installations for drilling and equipping of new gas wells and installation of additional equipment for existing wells, to cost $354,000.

Construction of transmission lines to reach new gas supplies, additional compressor stations, replacements of lines and installations because of obsolescence, and other transmission construction for improvement of service, will result in additional expenditures of $566,000.

Expenditures of $531,000 will be made for distribution construction and improvements, and general construction projects will cost $100,000.

New Gas Well Brought in At Goleta Storage Field

"Miller No. 1," the first of two gas wells being drilled at La Goleta dry gas field as part of the new La Goleta-Los Angeles pipeline project, was brought in on Oct. 14, and preliminary tests indicate it is one of the most phenomenal gas producers in the history of the California petroleum industry.

The new hole, it is explained by Pacific Lighting engineers in charge of this phase of the $4,000,000 pipeline and storage project, does not tap a new gas supply, but was drilled to increase the withdrawal rate of gas available in the structure.

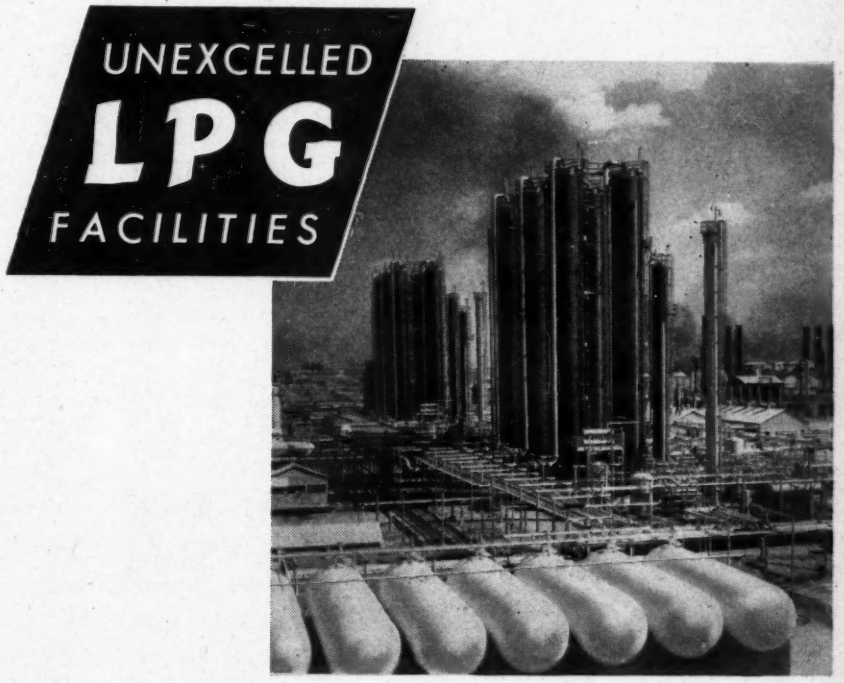
NFPA Lists Fire Causes

Gas and gas appliances (with 4000) are far down the list of fire causes as compiled by the National Fire Protection Association for 1943, which had a total of 668,000 fires with a property loss of $403,000,000. Primary fire causes were (1) smoking and matches, 134,000; (2) electric origin, 70,500; (3) defective chimneys and flues, 67,500; unknown origin, 65,000; defective or overheated heating equipment, 49,000; sparks on roof, 42,500; lightning, 30,000.

Natural Gas Used In Ammonia Production

One of the two largest plants in the country producing ammonia from natural gas has been completed at Lake Charles, La., according to George W. Dolan, president of The Mathieson Alkali Works (Inc.)

Built by the Defense Plant Corporation and operated under lease by Mathieson, the new plant is fully engaged in war production, the ammonia being used to produce high explosives. After the war, the operation is expected to manufacture chemical fertilizers for Southern farmers and anhydrous ammonia for refrigeration.



Phillips Petroleum Company takes great pride in the production facilities which have provided utilities with a full measure of Liquefied Petroleum Gas service despite the exigencies of war.

Philgas design, engineering, application and conversion experience covers every phase of Liquefied Petroleum Gas as applied to utility problems. Contact us on peak-shaving, cold enrichment, underfiring of coke ovens, conversion of water gas plants to propane-air, and similar problems.

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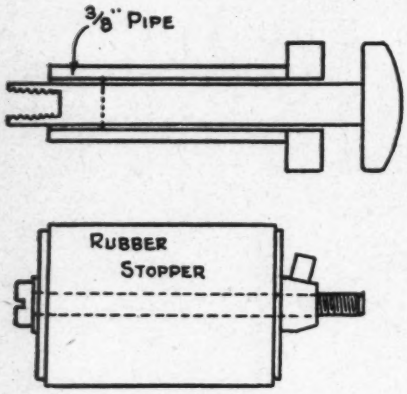
OPERATING IDEAS

Rubber Plug for Stopping Services

From AGA's "Report of Subcommittee on Wrinkles," W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

A soft rubber plug, held between two washers by a ¼-in. bolt and a specially designed lock nut is used to stop services where meters are removed, or when the pipe is to be pressure tested. A rod fitted on one end with a handle, and the other with a threaded-hole, is passed through a metal sleeve. One end of the sleeve is shaped to fit the designed lock nut. The rod is fastened to the bolt and

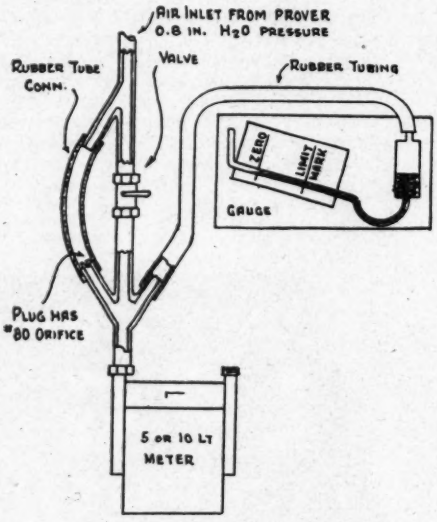


the stopper is compressed by tightening the lock nut. When the compression is complete both the rod and sleeve may be removed. The rod and sleeve may be of any desired length. The rubber plugs for 1-in. pipe are ⅞ in. in diameter, for 1¼-in. pipe 1⅛ in. in diameter and for 1½-in. pipe 1⅜ in. in diameter.

Set-up for 4-Pointing Meters

From AGA's "Report of Subcommittee on Wrinkles," W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

This set-up replaces the use of a gas flame for 4-pointing meters. The valve is opened and when compartment is filled with air the liquid in the slope gage will rise to the zero point, which is set at 0.8 in. W. G., the maintained pressure of the air at its source. The valve is then closed and if the compartment is leak tight the pressure exerted through the No. 80 orifice in the by-pass will hold the slope gage liquid at the zero point.



If there is a leak of any size the pressure will fall, and if it passes the limit mark within 3 sec. the meter is not passed. This limit mark must be set to maintain sound repair practice.

View Plug Pipeline

From AGA's "Report of Subcommittee on Wrinkles," W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

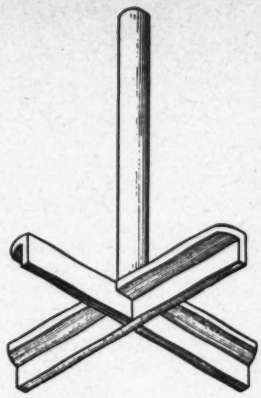
It is sometimes desirable to observe the condition of the interior of a main or service while the pipe is under pressure. To do this a transparent lucite view plug has been developed. By screwing the plug into a 1½-in. gate valve installed on a service tee or on a main tap and with the aid of a light directed through the plug, the interior condition of the main or service at that point may be observed. The device is particularly useful in obtaining information as to size or type of service tap which has been made in a main, and in locating obstructions.

Gadget for Removing Lime From Worthington Cylinders

CHARLES HELLEN, auxiliary engineer, Olpe Compressor Station, Panhandle Eastern Pipe Line Co., Kansas City.

The lime which forms between the spark plug well and the recess into which the well fits, in Worthington 1300-hp. cylinders, may be removed by the illustrated gadget.

The construction of the tool is as follows: take a piece of ½ in. angle



LIME FORMATION REMOVER
(FOR WORTHINGTON 1300 H.P. CYLINDERS.)

iron, which is 4 in. long. Then, take two pieces of ½ in. angle iron, which are 2 in. long. On one of these it is necessary to notch the top so it will sit under the projecting part of the 4 in. piece. The 2 in. piece will fit on the other, or smooth, side of the 4-in. piece. Next, weld each 2-in. piece in the center of the 4-in. piece. This will form a plus. Then, take a ⅜-in. rod, 12 in. long, and weld upright, taking care to get it in line with the cross on bottom of the angle irons. Then, trim on emery so all ends are 2 in. from the center, or 4 in. overall both ways. Next, round the top or projecting side of the angle iron just enough that it will turn in a 4-in. hole. Place the ⅜-in. rod in a drill chuck and you are ready to clean out the desired holes.

Removing the lime with a file, chisel, or screwdriver, as was formerly done, takes from one half to one hour. With this gadget, one to two minutes per hole are required after the air hose and drill are rigged up. The reason for the use of the angle iron on this gadget is to give it added strength, and to keep its edges from bending back.

Another way to make the gadget is by using four 2-in. pieces of ½ in. angle iron. Weld them together, as is shown in the drawing. Then, weld the drive stem, which is a ⅜-in. rod, 12 in. long, on the top side.

Insulating Bushings in Piping

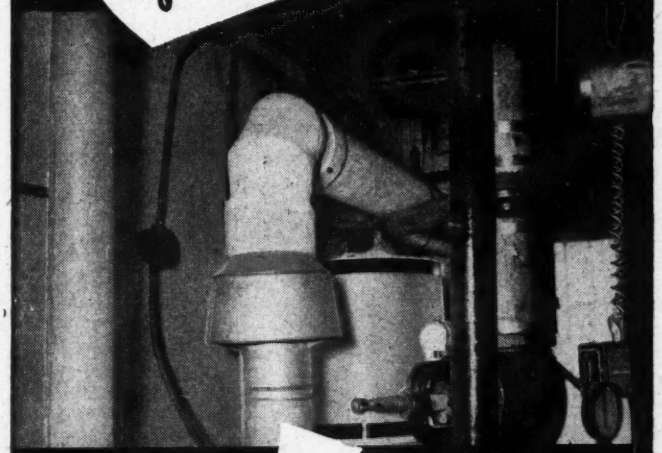
From AGA's "Report of Subcommittee on Wrinkles," W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

A formica bushing is installed between the riser and rigid connection of services connected to steel transmission mains. This insulation prevents electric currents in the house piping from flowing on to the main system.

It's non-metallic—cannot rust!

—light and easy to handle and support

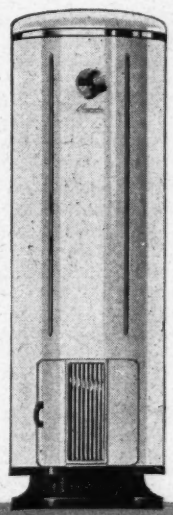
—it never needs painting!



—and of course a complete line of fittings

JOHNS-MANVILLE JM PRODUCTS

JOHNS-MANVILLE
TRANSITE FLUE PIPE
For venting gas-burning appliances



This book reveals the INSIDE story about SMITHway *Permaglas* Automatic Gas Water Heaters. It tells the complete facts about *Permaglas*... the permanently fused blue glass lining that keeps SMITHway Water Heaters always free from rust... always sanitary... long enduring! It is a profit-builder... a good-will creator... a source of information about the outstanding quality advantages available only in SMITHway Water Heaters. Prepare now for sales by getting this interesting book!

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SMITHway *Permaglas* GLASS LINED GAS WATER HEATERS

"Heated with Gas... Stored in Glass"

MAIL THIS COUPON TODAY!

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I'd like to get the "inside story" of *Permaglas!* Please send me a copy.
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PEOPLE

• **F. W. Williams** has been appointed secretary of the Residential Gas Section, American Gas Association, according to an announcement by **Alexander Forward,** managing director of the Association. He succeeds **John W. West, Jr.,** who has been secretary since Jan. 1, 1926. West, as assistant managing director, will continue his present administrative responsibilities in connection with the operation of the Section.

F. W. Williams

Williams has been assistant secretary of the Residential Gas Section since September, 1940. He joined the AGA staff, in 1937, as assistant director of the Home Appliance Planning Bureau.

Prior to his connection with the AGA, Williams was associated with the Brooklyn Union Gas Co. as new business representative specializing in architects' and builders' contacts.

• Electric Bond & Share Co. has announced changes in its executive personnel necessitated by the recent death of **Samuel W. Murphy,** president.

Directors have created the position of chairman of executive committee and have elected **C. E. Groesbeck,** now chairman of the board of directors, to this post.

Curtis E. Calder, president of Bond & Share's American Foreign Power Co., Inc., subsidiary, has been elected chairman of the board to succeed Groesbeck.

George G. Walker, vice president of Electric Bond has been elected president.

Lester B. Wiegers, secretary and treasurer, has been elected vice president to succeed Walker, in addition to continuing in his present capacity.

B. M. Betsch has been appointed assistant secretary-treasurer to assist Weigers.

Calder's position as president of American & Foreign Power Co., Inc., is being taken by **W. S. Robertson,** now vice president.

• **Louis Janssen,** formerly assistant purchasing agent for Rheem Manufacturing Co.'s West Coast Appliance Division, has been named sales manager for that division, which manufacturers water heaters, floor furnaces, septic tanks, range boilers, and Stokomatic furnace feeders.

• According to an announcement made recently in Calgary, Alberta, **E. Holley Poe,** former associate director with the Petroleum Administration for War at Washington and well-known consultant on natural gas utilities, has been retained as consultant to the Alberta Gas Producers' Committee. Poe was in the Canadian city recently for a short period going into the situation with those of the committee entrusted in preparing a brief for submission to the Alberta Natural Gas Utilities Board.

• **Cecil MacGregor,** formerly of the commercial department, Portland Gas & Coke Co., Portland, Ore., after a year in the army service forces, Washington, D. C., has been promoted to the rank of lieutenant colonel. MacGregor entered the army as a reserve officer four years ago.

Last summer, he attended the command and general staff school, Fort Leavenworth, Kans. He now helps supervise training activities of all components of the army service forces.

• **John H. Newlon,** former Superintendent of Production and Geologist, Equitable Gas and Pittsburgh and West Virginia Gas Companies, has been appointed assistant to operating manager. **John V. Goodman,** former assistant geologist, has been appointed the new superintendent of Production and Geologist.

• **Robert Lawder** of the Consolidated Edison Co. of New York Inc. has resigned as secretary-treasurer of the Metropolitan House Heating and Air Conditioning Council, it was announced at the council's regular monthly meeting held Nov. 15 in New York. His resignation took effect Dec. 1 at which time he took up new duties with the personalized heating division of Minneapolis-Honeywell Regulator Co.

Edward J. Gerridge, The Brooklyn Union Gas Co., was elected to serve out the balance of Lawder's term of office.

• **Earl Foster,** attorney for the conservation department of the Oklahoma Corporation Commission since 1935, was elected secretary of the Interstate Oil Compact Commission, effective December 1, at a meeting of the compact's executive committee.

Earl Foster

As chairman of the legal committee of the Compact Commission and acting in advisory capacities to the Commission and its other committees, Mr. Foster has become conversant with the various activities of that body.

E. G. Dahlgren, who has served as acting secretary of the Interstate Oil Compact Commission, since resignation last July of **Charles L. Orr** as secretary, retains his position as assistant secretary and also is full-time secretary of the research and co-ordinating committee.

The executive committee also appointed Ted Knoop, former long-time assistant secretary, as secretary of the Compact Commission's Interstate Relations Committee.

The executive committee also set the next quarterly meeting of the Compact Commission for December 14, at Jackson, Miss. Mississippi is rapidly developing as an oil producing state.

• The appointment of **George D. Creelman** as administrative assistant to the director has been announced by the Institute of Gas Technology.

Creelman's duties include recruiting research personnel, coordinating the institute's work in the field of patents, and overseeing its library.

Formerly research engineer for the Monsanto Chemical Co., St. Louis, Creelman, a Harvard graduate, had previously worked for eleven years with the M. W. Kellogg Co. in New York City. His work there included the organization of a patent department and a company library.

• Four appointments to the staff of the Institute of Gas Technology, were announced November 17 by **John I. Yellott,** director.

Leslie J. Kane, who will serve as associate chemical engineer, has had 15 years of experience in chemical research and engineering. His last position was with the Tiokol Corp. in Trenton, N. J., where he had worked since 1942. Kane was graduated in 1929 from Armour Institute of Technology, one of the predecessors of Illinois Institute of Technology.

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. . . When you see the new
POST WAR DESIGNS OF HAMMEL GAS HEATING EQUIPMENT

Our complete post war line is ready for production the moment materials are released—**and what a surprise** for you. New models! New designs! And new features. You'll want the facts about Hammel residential, commercial and industrial gas heating equipment . . . so write today for full information.

Since 1912
Hammel
RADIATOR ENGINEERING CO.
A. S. Martinson & Associates
Successors to Hammel Radiator Corp.
3348 Motor Avenue, Los Angeles 34, Calif.

There's Still a Job to be Done

The war in Europe appears to be nearing its end—and we are humbly grateful—but the work of our soldiers and sailors and war industries is not yet done.

It **would be glorious** to border these lines with flags of final victory.

It would be a grand sensation to write without reservation about the coming Peace and postwar planning.

But **we still have much to do.**

If the Nazi were to surrender tomorrow there still is a tremendous job for our Army and Navy and their planes and ships in the Pacific.

There's still the barbaric Jap to be bombed and shelled until he yells "Honorable Uncle."

In order that our customers be served adequately, we are keeping our compressors pumping Gas into the mains every one of every twenty-four hours.

The furnaces and the thousand and one other tools of our war industries will not lack for Gas Heat to keep on producing the weapons of war. **It is to be hoped they will not lack hands to operate them.**

And when Peace does come an abundant supply of Gas will be ready and waiting to help create and maintain postwar production and jobs.

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

Formerly research chemical engineer for the M. W. Kellogg Co. and the Kellex Corp., **William Volk** will serve as assistant chemical engineer in the institute's coal and coke section. His first assignment concerns improved methods of utilizing southern Illinois coal. He is a 1939 graduate of New York university and has done advanced work at Brooklyn Polytechnic institute.

M. Frank Knoy has been appointed senior mechanical engineer in the appliance section, where he will do research and will work on the design of gas burners and ranges and on special problems of appliance manufacturers. A graduate of Texas Christian university, he has devoted his time since 1927 to various phases of engineering. For the last eight years he has served as combustion engineer for the Long Beach Municipal gas department. He is the author of more than a dozen magazine articles and holds patents on several inventions.

A new junior physicist on the institute's staff is **Lewis B. Leder,** who was graduated from the University of Idaho in 1943 and until June was instructor in physics at Williams college in Massachusetts. Later he did optical work at the Bell and Howell company.

• **Dr. Jesse E. Hobson** has been appointed director of the Armour Research Foundation of Illinois Institute of Technology to replace **Harold A. Vagtborg,** who has recently been named president of the Midwest Research Institute in Kansas City, Dr. Henry T. Heald, president of Illinois Tech, announced last month.

His appointment was effective immediately. Vagtborg, who will report to his post in Kansas City on January 1 will stay on at the Armour Foundation in an advisory capacity until that time.

The new director of Armour Research, Dr. Hobson, has been head of the electrical engineering department at Illinois Tech since 1941.

• Changes in organization, now effective, result in several promotions in the Public Utilities Department of the California Railroad Commission, it was announced by **E. F. McNaughton,** director of the Department, following approval by the Railroad Commission and the State Personnel Board.

Roy A. Wehe

Separate divisions have been established for gas and electric operating and rate problems, **Roy A. Wehe** having carried on those duties in the interim, since his appointment on April 1, as assistant director of the Department. Under the plan of operation, Wehe is normally responsible for the planning and conduct of major formal and informal rate investigations, special investigations as assigned, and coordination of the work of the Gas and Electric Divisions. In the absence of the director, he has general charge of the department.

C. T. Mess, with change of title to chief, Division of Valuation, will continue to have responsibility for inventory and appraisals, accrued depreciation and rate base determinations.

Charles W. Mors has been appointed research engineer, succeeding **Walter B. Wessells,** who had temporarily carried on in charge of the Research Division as well as the Telephone and Telegraph Division since the latter's appointment as telephone and telegraph engineer on June 1.

Lloyd E. Cooper is the newly appointed gas engineer. He will supervise the activities of the Gas Division.

Robert P. O'Brien is newly appointed electrical engineer in charge of the Electric Division; and **M. R. MacKall,** hydraulic engineer, is in charge of the Hydraulic Division.

• **Gordon M. Peterson,** assistant to the general commercial manager, Public Service Electric and Gas Co., Newark, N. J., has been appointed chairman of the Personnel committee of the American Gas Association. In addition to making important war contributions through manpower studies, the committee is now devoting particular attention to the problems of returning servicemen.

The new committee chairman has been active for many years in personnel committee work of national associations in both gas and electric utility industries. A graduate of Princeton University in 1925, Peterson joined the Public Service Electric and Gas Co.

Use CLEVELAND BABY DIGGERS

On Those Long-Postponed Distribution Jobs

The Cleveland Baby Digger — the trencher that first made machine digging economy possible on short scattered urban distribution jobs . . . is tougher and faster than ever, yet enjoys the same compactness and mobility as always. • Write now for details . . . "CLEVELANDS" are available for next year's work.

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"CLEVELANDS" Save More . . . Because they Do More

immediately after completing his education. For several years, as director of educational work, he was in charge of the company's employee training program. He was appointed to his present position in 1940.

• **J. G. Merkle,** for several months attached to the personnel department Southern California Gas Co., Los Angeles, is being transferred back to the sales department, where he will have the title of general supervisor, market analysis and sales promotion.

According to the announcement made by general sales manager **W. M. Jacobs,** Merkle's new activities will include supervision of market studies, utilization of survey data, development of sales promotional plans, sales campaigns and related trade contacts, and development of sales training programs. His transfer became effective Oct. 1.

At the same time, it was announced that **R. V. Davis,** supervisor of sales promotion, has resigned his position, effective Oct. 15, to accept a sales post with the household appliance division of the A. O. Smith Corp. in Southern California.

• Appointment of **R. I. Snyder,** division engineer of the central division, Southern California Gas Co., to the position of division superintendent, San Joaquin Valley Division, is announced by distribution department manager **Elting Henderson.** The transfer became effective Oct. 15.

Snyder succeeds **F. H. Biddington,** who has been superintendent of distribution at Visalia since 1931 and who is resigning to go into business for himself in Visalia.

S. A. Bradfield, leakage engineer, will take the position vacated by Snyder. The position of leakage engineer will not be filled for the present, Henderson announced. He stated, however, that Bradfield will "continue to keep certain statistical data having to do with system wide leakage and will continue to direct, as in the past, the leakage control throughout the system."

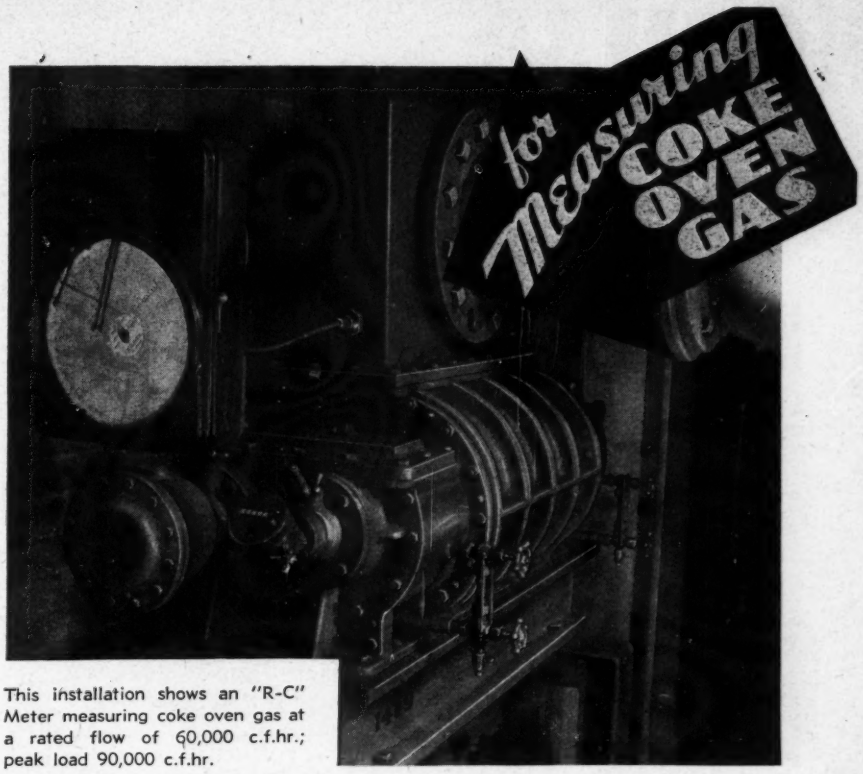
• **Lt. Col. A. R. Bailey** (formerly assistant to the president, Coast Counties Gas and Electric Co.) was recently reported as being in England.

• **Lt. Col. J. J. Winn, Jr.** (formerly sales manager, Portland Gas and Coke Co.) who had a part in getting supplies across to our armies in France, has been returned home for a rest. He is reported to have lost 50 pounds.

• **Ray Penning,** sales manager, Spokane Gas and Fuel Co., has joined the Buchanan Chevrolet Co. in Spokane as manager of its truck and fleet department. Penning had been with the gas company for 25 years starting in the gas plant as an operator.

• **Frank C. Smith,** president, Houston Natural Gas Corp., Houston, Texas, has announced the appointment of **Larry L. Ladewig** as head of the new Department of Gas Utilization.

A graduate engineer of Texas College of Arts and Industries, Ladewig has been associated with Houston Natural for more than five years.



This installation shows an "R-C" Meter measuring coke oven gas at a rated flow of 60,000 c.f.hr.; peak load 90,000 c.f.hr.

OUTSTANDING ADVANTAGES

1. Efficient Rotary Positive Displacement principle assures highest accuracy obtainable.
2. All-metal construction assures long life and **sustained** accuracy.
3. Tamper-proof construction.
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5. Negligible pressure absorption.
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7. Extremely compact in relation to volume handled.
8. Built in sizes from 3,000 c.f.hr. to 1,000,000 c.f.hr.

ROOTS - CONNERSVILLE BLOWER CORP.

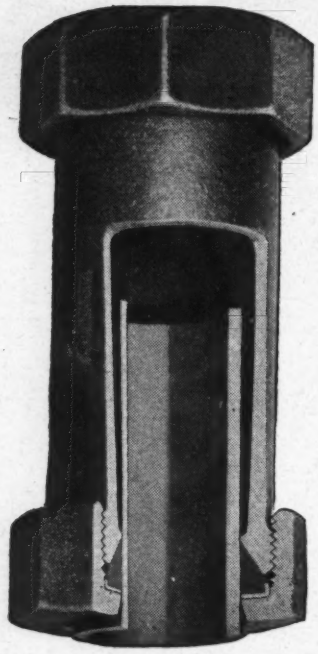
Write for Bulletin 40-B-13

One of the Dresser Industries
412 Oregon Avenue
Connersville, Indiana

Roots CONNERSVILLE SINCE 1854 GAS METERS

NORMAC

COUPLINGS, SLEEVES AND FITTINGS



for maximum deflection, ease of "stabbing," complete confinement of the rubber!

So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

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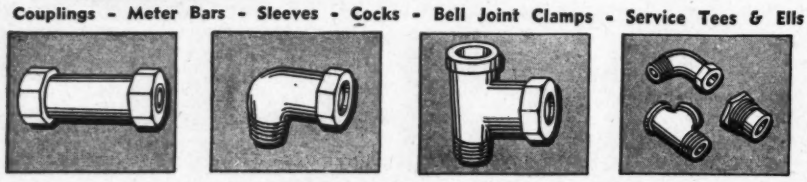
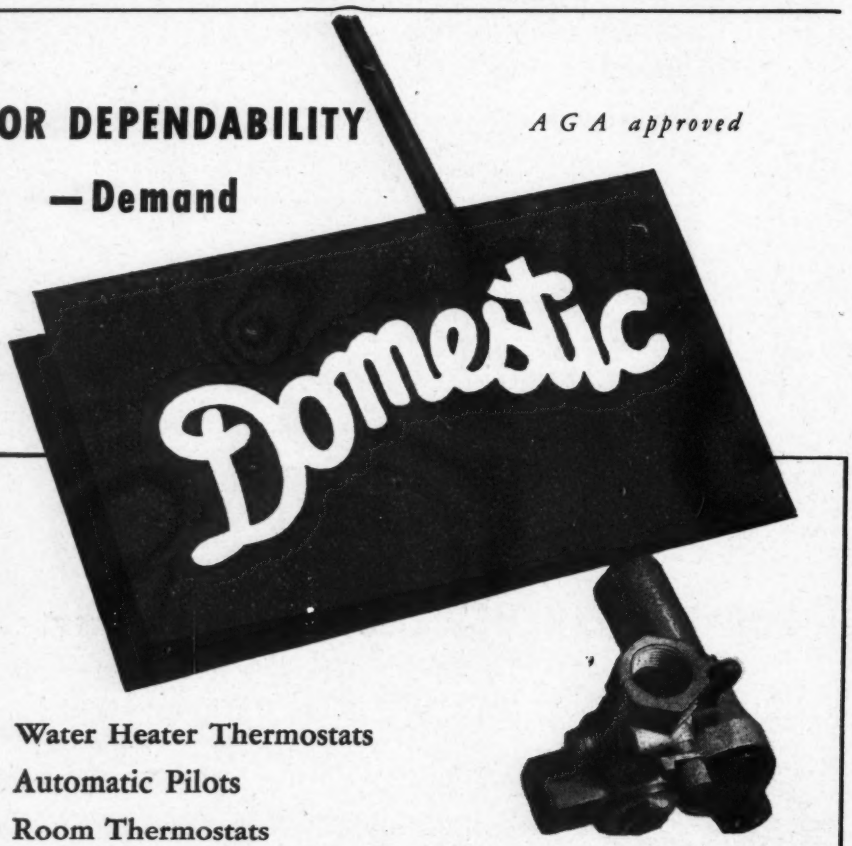


FOR DEPENDABILITY —Demand

A G A approved

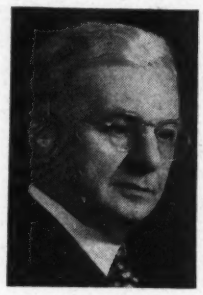


Water Heater Thermostats
Automatic Pilots
Room Thermostats

DOMESTIC THERMOSTAT COMPANY LOS ANGELES CALIFORNIA

Manufacturers

• **R. H. Lewis** has been named president and general manager of the Ruud Manufacturing Co., Pittsburgh, Pa., makers of gas water heaters. He succeeds **A. P. Brill** who has been made chairman of the board. Other new officers are: **J. H. Sorg,** vice-president and counsel; **M. M. Scott,** vice-president in charge of sales and advertising; **K. M. Clark,** secretary and treasurer, and **J. K. Roth,** assistant secretary and assistant treasurer.



R. H. Lewis

Members of the new board of directors are **A. P. Brill,** chairman; **R. H. Lewis, J. H. Sorg, K. M. Clark, M. M. Scott, M. G. Hulme, W. W. McVay, W. R. Daley** and **M. W. Taylor.**

• **A. M. Buxton** has been promoted to assistant sales manager of The Cooper-Bessemer Corp., it is announced by **S. E. Johnson,** general sales manager, with headquarters at Mount Vernon, Ohio.

A. M. Buxton

In addition to sharing responsibilities of the general sales manager, Buxton will direct the company's oil and gas field sales, according to Johnson, since he has been working closely with these fields in his former position at the company's Tulsa office.

Buxton has been with Cooper-Bessemer for 20 years. He is 43, married and has one child. He has moved his residence from Tulsa to Mount Vernon.

• **Norman E. Thompson,** formerly with Republic Steel Corp., who joined Rheem Manufacturing Co. in January, has been appointed production manager of the nine Rheem plants comprising the company's eastern division. These plants are located at Bayonne, N. J., Sparrows Point, Md., Danville and Williamsport, Pa., Birmingham, Ala., New Orleans, La., Houston, Tex., and Chicago, Ill. (2 plants). Thompson, a native of Michigan, graduated from Michigan College of Mines in 1919 with the degree of bachelor of science. He is a member of the American Institute of Mining and Metallurgical Engineers.

• **Lyle C. Harvey,** president, Bryant Heater Co., Cleveland, has announced the appointment of **William R. Teller** as director of research and development. Teller has been assistant director of the American Gas Association Testing Laboratories in Cleveland. He served this institution in various capacities since 1930.

Teller was graduated from the Case School of Applied Science, in 1927.

CURRENT READING

Abnormal Pressures Create Drilling and Completion Problems in Deep Test—E. H. Short, Jr. "Oil and Gas Journal", Sept. 30, 1944, pp. 70, etc. Drilling through high-pressure formations in the Cotton Valley field, La., where there are four productive pools presents perplexing problems, solution of which lies in the selection of equipment and application of technical skill. This article is a description of those problems and the measures employed in successful completion.

Trend in Pipe-Line Practices—W .G. Heltzel. "Oil and Gas Journal," Sept. 23, 1944, pp. 154, etc. Part 1. A survey of the status of pipe-line design, construction, and operation.

Thirteen Years of Corrosion Mitigation—O. C. Roddey and L. R. Sheppard. "Oil and Gas Journal", Sept. 23, 1944, pp. 210, 213, 214. It is no longer necessary to discuss the merits and demerits of electrical drainage subsurface structures such as pipe lines, telephone and telegraph cables, buried signaling devices, power plants and substation equipment. It is an established engineering fact that all such structures can be protected from failure due to corrosion when proper methods are applied. Some of these methods are discussed in this article.

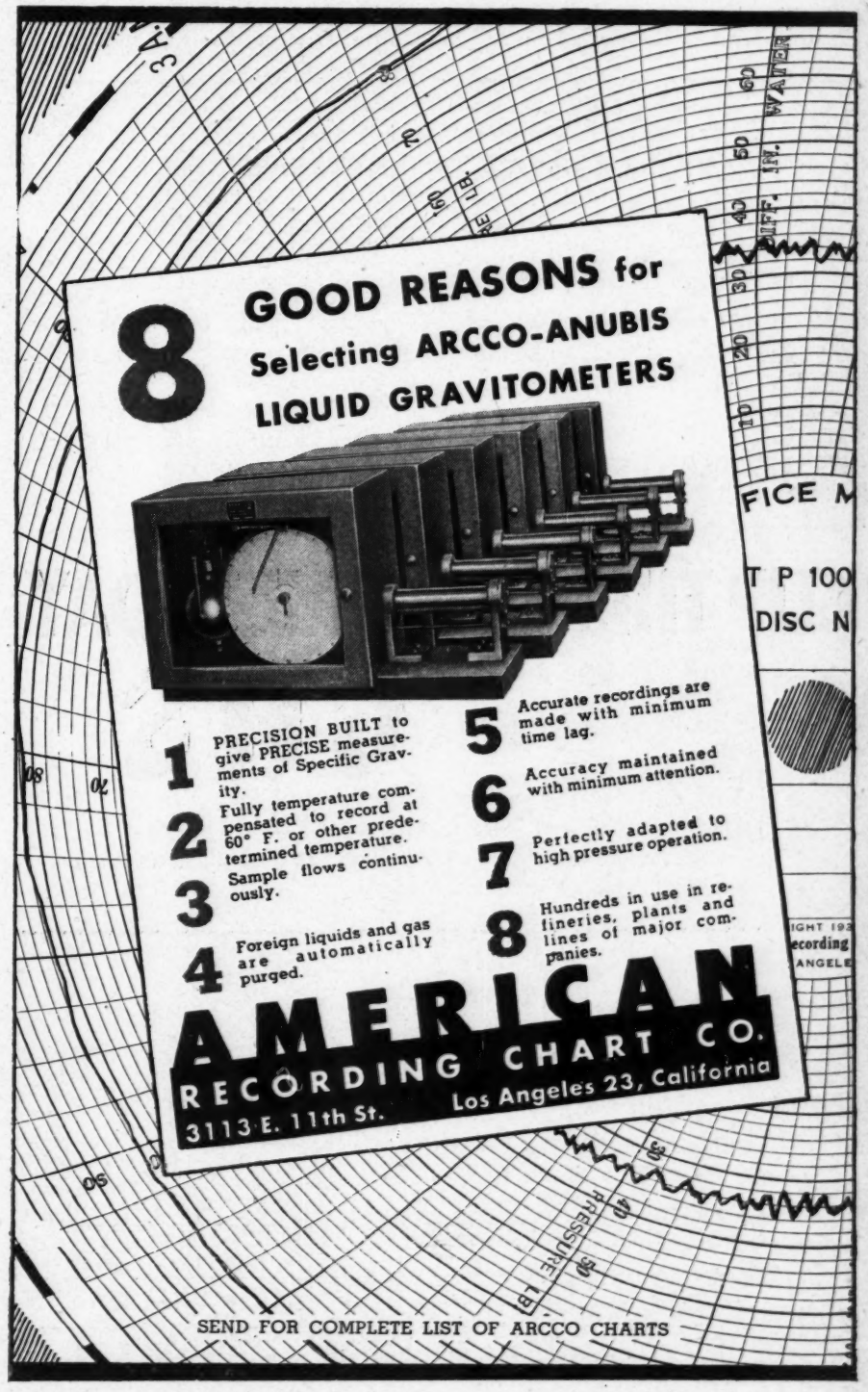
Inside Line-Up Clamp for Large Diameter Pipe—"Oil and Gas Journal," Sept. 23, 1944, p. 221. To solve a problem which arose with the increase in tensile strength of steel which brought a trend toward thinner walls of large-diameter pipe being used to a greater extent in construction of natural-gas lines, a new hydraulic inside clamp has been developed. This device, known as the Price-Elliott inside-line-up clamp, is described and illustrated.

Laying Pipe Lines in Marshes—T. L. Turner. "Oil Weekly", Sept. 18, 1944, pp. 53, 54, 56. New method used in South Louisiana pushes welded sections of pipe into ditch plowed through marsh and canal bottoms. Described and illustrated.

Phillips Petroleum Company Experience in Use of Pearson Electronic Coating Inspector—L. A. Hugo. "Petroleum Engineer", Sept., 1944, pp. 170, 172. In an article entitled "Electrical Examination of Coatings on Buried Pipe Lines" by Dr. J. M. Pearson, January 31, 1941, details were given for test equipment and procedure for locating holes in coating on buried pipe lines. It is the purpose of this paper to present some of the results obtained in testing approximately 150 miles of asphalt-mastic coating and 45 miles of coal tar enamel with bonded wrap of 15-lb. asbestos felt with an instrument such as described by Dr. Pearson. It is not the intention of this report to compare the relative merits of different types of coatings but rather to report on the use and results of the application of Pearson's device.

Iron Oxide Versus Liquid Treating for Purifying Natural Gas—C. F. Turner. "Oil and Gas Journal", Sept. 23, 1944, pp. 191, etc. When sour natural gas is encountered during development of a gas field it is usually necessary to remove the hydrogen sulfide before the gas is acceptable for distribution to gas-company customers. A question naturally arises as to the choice of methods to use for its removal. If the volume of gas to be treated is large or the concentration of hydrogen sulfide is high there is no alternative; the only practical method is some form of liquid purification process in which the gas is scrubbed free of hydrogen sulfide by bringing it into intimate contact with a liquid which will combine with the hydrogen sulfide. Such a system is continuous and easily adjusted to varying rates of flow and degrees of sourness. If, on the other hand, the volume of sour gas is small or the hydrogen sulfide concentration is low, the iron-oxide sponge method, which has been used in the manufactured-gas business for years, may have certain advantages over the wet method and should not be ignored when occasion arises to consider possible purification processes.

Thermodynamics of Gaseous Paraffins. Specific Heat and Related Properties—K. S. Pitzer. "Ind. and Engr. Chem.", Sept., 1944, pp. 829-831. Available experimental gas specific-heat values for the normal paraffins are in excellent agreement with curves calculated by methods previously published by the author. Certain parameters in these calculations are revised on the basis of recent spectroscopic studies. Calculated entropies are still in excellent agreement with measured values. The corresponding results for heat content and the free energy function are also presented.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3 Sample flows continuously.
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SEND FOR COMPLETE LIST OF ARCCO CHARTS

GAS METER INDEXES AND FITTINGS

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We will be pleased to submit quotations to your specifications and blueprints.

THE E. F. GRIFFITHS CO.

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IT'S LIKE *writing* **A LETTER HOME**

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

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IF YOU ARE NOT A REGULAR SUBSCRIBER TO **GAS**

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STREET CITY ZONE STATE

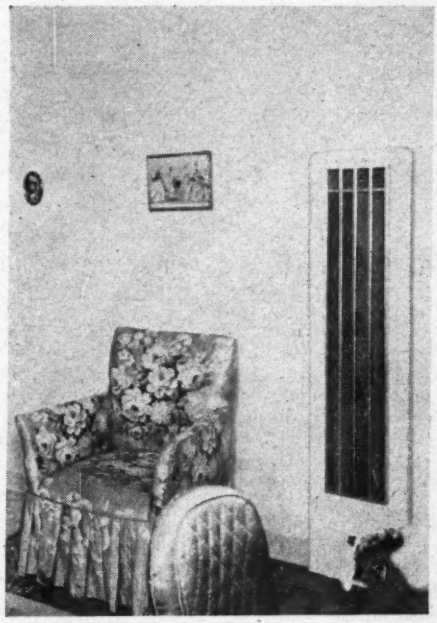
NEW PRODUCT

Infra-Red Wall Heater

Day and Night Manufacturing Co., Monrovia, Calif.

Model: Panelray, a new vented type wall heater installed entirely above floor level which extends only 1½ in. from the wall. For both home and commercial use.

Description: This new gas appliance heats by radiation, sending out thousands of infra-red rays. These travel at the speed of light and penetrate the blood stream before the air is warmed according to the manufacturer. This means that the people in the room obtain the heat directly and do not have to wait for the room air



to warm up. Present experience indicates lower than average gas usage.

To illustrate that the Panelray actually does radiate infra-red rays, Day and Night photographed the lighted heater in complete darkness with infra-red film with a three hour exposure. This film showed that thousands of infra-red rays radiated from the heater.

There are single units of 10, 20, or 30,000 Btu. and dual units of 20, 30 or 40,000 Btu.—all approved by the American Gas Association laboratories. While Panelray is principally a post-war heater, limited production quotas are now being filled.

Where butane and propane gases are used, the burners in Panelray have been especially designed—they are not mere adaptations of natural gas burners.

Installation: In dual installations consisting of two complete Panelray units, each unit is regulated separately and independently of the other. Using the same 4-in oval vent, it is possible to install one unit of two heaters to serve adjoining rooms. The Panelray fits any standard 4-in. stud wall, and does not require cutting of floors or rugs. No underpinnings or substructures are necessary. The unit comes complete in a "package" making it easy for the dealer to install.

Pipeline Training Course Completed and Available

A new vocational-training course entitled "Oil Pipe-Line Transportation Practices," identified officially as "Vocational Training Course No. S-6 of the Petroleum Industry Series, has just been completed and is available from the Division of Extension of the University of Texas, Austin, Texas, the Division of Production of the American Petroleum Institute has announced.

This course is the result of several years' work on the part of a special committee headed by L. E. Davis of Sinclair Refining Co., Pipe Line Department, Independence, Kans., in cooperation with O. H. Beaty of the Kansas State Board for Vocational Education; is sponsored by the Division of Trade and Industrial Education of Kansas under the direction of State Supervisor Laurence Parker: and is published by the Bureau of Industrial Teacher Training, Division of Extension, of the University of Texas, under the supervision of Acting Director of Industrial Education Charles Cyrus.

The publication consists of 14 individual chapters, each prepared by qualified authors experienced in the specific subjects covered. Copies are available at $3.00 each.

New York State Natural To Buy Peoples' Facilities

The Federal Power Commission Nov. 14 authorized the New York State Natural Gas Corp., Pittsburgh, Pa., to acquire for $815,256.77 certain facilities it now operates under lease from the Peoples Natural Gas Co.

Facilities to be acquired include about 89 miles of 12-in. pipeline extending from a point in Clarion County to a junction with New York State Natural's line in Potter County, Pa., a private telephone line paralleling the pipeline, and 58 ft. of 12-in. pipeline extending between the line to be acquired and Peoples' Pew Compressing Station. These facilities have been operated by the applicant since December 5, 1939 under lease from the People's Natural Gas Company, at an annual rental of $120,000, and New York State Natural has been purchasing natural gas from Peoples since the same date.

Texas Gas Value Rated Ahead of Oil

Natural gas resources of Texas will bring more money than its remaining oil reserves, according to a prediction by Col. Ernest O. Thompson of the Railroad Commission. "One constructive thing would be a rule or law that no oil could be produced unless the gas that came out with the oil was returned to the reservoir for maintaining the reservoir pressure or stored or fully utilized for light or fuel or for manufacturing synthetic products; that would be real conservation and waste prevention," Thompson said.

No Butane for Drilling

PAW Directive 79 prohibits the delivery of butane for use as a fuel in drilling operations where natural gas is available. The directive is effective from Nov. 1 to April 1, 1945.

and THAT OPERATES UNDER PRESSURES UP TO 150 lbs. PER SQ. INCH?

• This new lightweight shut-off valve operates equally well in either gas or liquid lines, has free unrestricted flow, is adaptable to all types of fuel and oil lines. No metal-to-metal contact, positive sealed with "O" type seal rings. It's accurately indexed to 90°, 180°, 270° and 360°. Simple in construction—it can be supplied in all styles and sizes for use as a drain cock, shut-off or selector valve in water, fuel or hydraulic systems. For complete information, write engineering department—indicate use or application desired.

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Send for complete details regarding available sizes and specifications.

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Panhandle Eastern Outlines 1944 Construction Projects

Six major construction activities have held the attention of the Panhandle Eastern Pipe Line Co., Texas, during 1944. These were:

The 22-inch loop line, approximately 18 miles in length, between Hansford Station and Liberal.

The 14-mile 22-inch gathering line into Hansford Compressor Station from a Phillips Gasoline Plant.

Three gas contacting vessels for the Sneed Dehydration Plant.

The installation of the new 1200-h.p. Worthington Compresser for Montezuma Station.

Additions to Zofness, Fritch, Sneed, and Hansford camps.

A new water supply system for Olpe compressor station.

Also, for the past several months, small contracting crews have been engaged in cleanup work around various compressor stations. This work was necessitated by last year's large expansion program.

Move to Consolidate Pittsburgh Companies

The Manufacturers Light and Heat Co., a new corporation, has filed a certificate of public convenience and necessity with FPC to acquire and operate all the facilities of The Manufacturers Light and Heat Co., the constituent company, Greensboro Gas Co., Manufacturers Gas Co., Pennsylvania Fuel Supply Co., and Fayette County Gas Co.

The application was filed under Section 7 of the Natural Gas Act, as amended, on November 9, 1944. All the companies involved in the proposed transaction are subsidiaries of the Columbia Gas and Electric Corp., and have their offices in Pittsburgh.

Home Service Committee Publishes Two Bulletins

A sub-committee of A. G. A.'s Home service committee, chairmaned by Mildred Clark, Oklahoma Natural Gas Co., has prepared an Interim Bulletin "Programs for Young America." Directed to children of high school age who have proved particularly receptive to demonstrations which help them in wartime home jobs of food selection, marketing and meal preparation, the bulletin contains programs for young people as carried on in several gas companies. Price is 10c per copy, and may be obtained by writing to the Association in New York.

A second study undertaken in the 1944 Plan of Work is entitled "Home Calls in Wartime", by Mrs. Mary N. Hall, Consolidated Gas Co., Elizabethtown, N. J. The report shows an active interest in this type of work, even with wartime restrictions affecting transportation, and an expectancy of accelerated interest postwar.

Steel for Gas Appliances

WPB has allocated 17,000 tons of steel to the production of gas appliances; 13,000 tons being allocated to cooking equipment and 4,000 tons to heating equipment.

SEMET-SOLVAY
ENGINEERING CORPORATION

Blue Gas Plants
Water Gas Machines
Washer Coolers
Naphthalene Scrubbers
Gas Purifiers
Condensers
Waste Heat Boilers
Producer Gas Plants

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SKINNER
Leak Clamps Saddles
M. B. SKINNER CO.
SOUTH BEND, IND.

CLAMPS AND SADDLES FOR CAST IRON AND STEEL PIPE. STANDARD OF THE WORLD FOR NEARLY HALF A CENTURY

PIPELINE NEWS

• The Federal Power Commission has authorized the **United Natural Gas Co.**, Oil City, to construct and operate a 37½ mile 12¾ in. pipeline to operate an 18.2 mile 12¾ in. pipeline which has already been constructed. These pipelines are required in order that the United Natural may receive, transmit, and distribute 3,160,000 Mcf of natural gas which the FPC has authorized it to buy annually from The Manufacturers Light and Heat Co. of Pittsburgh.

• **Louisville Gas and Electric Co.** has been authorized by FPC to construct a 65-mile pipeline to connect with the recently completed Tennessee Gas and Transmission Co. line. The line (62 miles of 8 in. and 3 miles of 12 in.) will extend from the company's Cannons Lane mixing station at the city limits to a point of interconnection with Tennessee near Calvary, Ky. Louisville expects to draw 10,000 Mcf. daily from the Tennessee line.

• **Alabama-Tennessee Natural Gas Co.**, Florence, Ala. has applied to FPC for permission to construct a 66 mile 10¾-in. to connect with Tennessee Gas and Transmission Co. line near Enville, Tenn. and extend to the plant of the Reynolds Metal Co. near Muscle Shoals, Ala. Estimated cost of the project: $1,350,186.

• **The Metropolitan Natural Gas Co.** proposes a 26-in. pipeline to transport natural gas from the Permian Basin of West Texas and New Mexico to Los Angeles, Calif. The line costing $40,000,000, with an ultimate capacity of 350,000,000 cu. ft. a day.

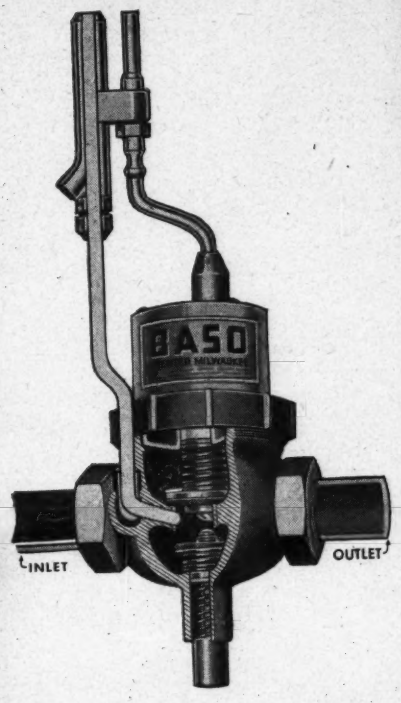
Winkler County, in west Texas, will be the location of a large field compressor station, while C. V. Lyman, Midland, proposes to erect a natural gasoline plant to operate in conjunction with the proposed pipeline. Arrangements have been concluded with Lyman for the supply and delivery of approximately 200,000,000 cu. ft. of gas a day, which is estimated the initial load of the line.

Consolidated Gas Utilities Purchases Franchises

The Consolidated Gas Utilities Corp., Oklahoma City, Okla., has purchased from the Oklahoma Natural Gas Co., Tulsa, equipment and franchises in the cities of Deer Creek, Pond Creek, Nardin, Hunter, and Lamont in north central Oklahoma. The transfer was made, effective December 1, E. C. Joullian, president, announced.

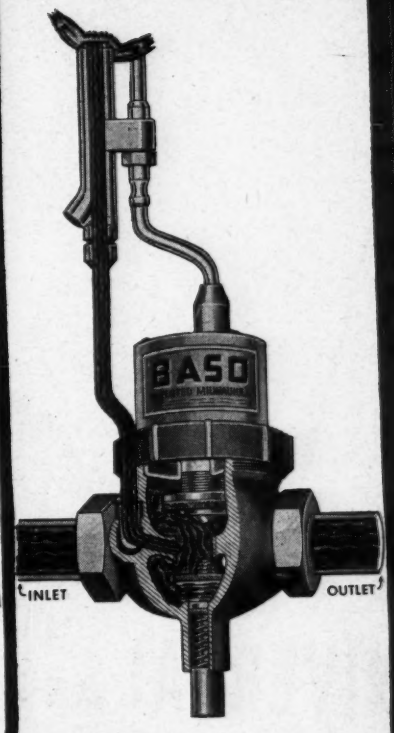
The distribution systems taken over are located on a principal transmission line of the Consolidated and have been served on a wholesale basis from that line. They will be important additions to the Consolidated Gas Utilities Corp., transmission and distribution system which extends from southwestern Oklahoma, through western Oklahoma to Wichita, Kan., and on north in Kansas. Major sources of supply are in the east end of the Amarillo field and in the Sayre and Erick fields, of Beckham county, Okla.

BASO



1 In case of pilot flame failure, all gas flow is shut off to pilot burner as well as to main burner.

2 Baso 100% *Flow Interruption* provides safe starting of appliance. Gas flows only to pilot burner during pilot lighting.



3 Baso permits gas to flow to main burner, only after: (a) pilot is lit, (b) magnet holds valve open, (c) reset button has been released.

100% FLOW INTERRUPTION

assures SAFE LIGHTING of Appliances

● An automatic pilot's job is to shut off the flow of gas ...*instantly* and *positively*...when the pilot flame fails.

That's exactly what the Baso does. When the pilot flame goes out, *all gas flow is shut off*—to the pilot burner and to the main burner.

The appliance is put into operation by manually resetting the Baso and relighting the pilot burner. All danger of burns from premature ignition of main burner is effectually *prevented* by *Baso 100% Flow Interruption!*

This *exclusive* Baso design feature suspends all flow of gas to main burner...permits gas to go only to pilot burner. Only *after* reset button is released can gas again flow to main burner. For *safety at all times*—Baso!

Baso valve models are designed for use with all fuel gases. Custom-built Basos for floor furnaces, water heaters and other specialized installations; and switch type models for control of electric main burner valves are also available.

A.G.A. & U.L. APPROVED—Patented.

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MILWAUKEE 3, WISCONSIN

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UNIVERSAL ASSURES A STANDARD OF PERFORMANCE THAT GUARANTEES COOKING SUCCESS

The present generation of housewives will expect, and need a cooking appliance that places home cooking on the basis of an exact science. The war worker of today will be the homemaker of tomorrow. She will demand guaranteed cooking success. Predetermined time and temperature cooking will replace guess work. Meal preparation by trial and error will be supplanted by adherence to modern cooking methods.

Such requirements will place a greater demand than ever before on the service performance possibilities of the gas range. It must in truth, be a cooking machine—it must give the assurance of success, without care or attention, in every phase of cooking, if it is to meet the critical demands of women, who by virtue of their war work experience, will expect the same precision in the cooking range as they experienced in the machines of industry.

Universal in the past gave that type of performance—advanced, engineered devices assured precision cooking. In the future Universal will give an expanded and an even greater service performance. The proof of the Universal gas range will be the perfection of its cooking results. The Universal will guarantee to the homemaker a new and higher standard of cooking performance.

For High Achievement — ARMY E NAVY — In War Production

CRIBBEN AND SEXTON COMPANY

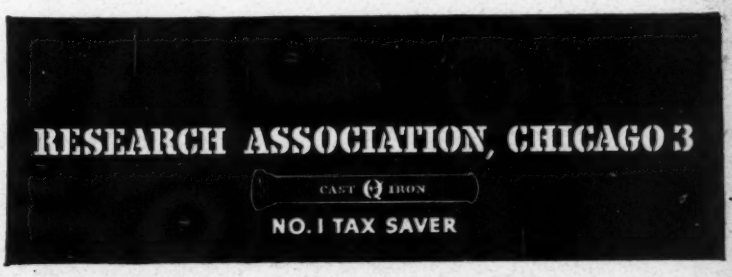
MANUFACTURERS OF UNIVERSAL GAS RANGES

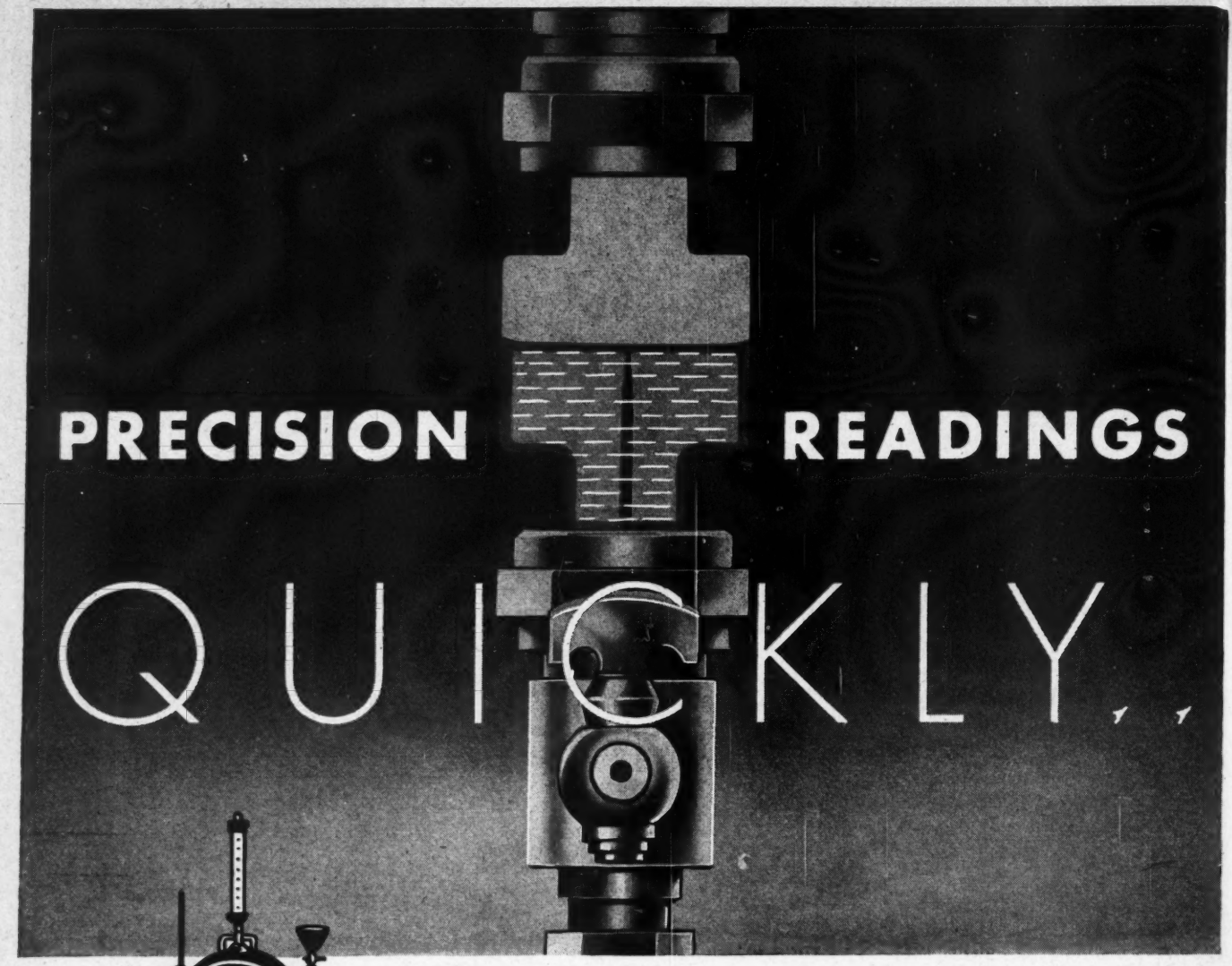
700 N. SACRAMENTO BLVD. . . . CHICAGO 12, ILLINOIS

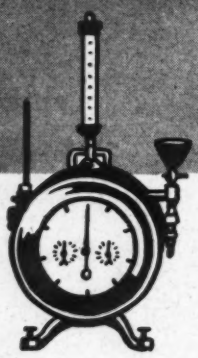
For more than a century, cast iron pipe has been the mainstay of gas distribution systems. In the great majority of cities in the United States, most or all of the original cast iron mains are still in service. The long life and low cost per service-year of cast iron bell-and-spigot pipe have thus been proved beyond question. For, until 15 years ago, practically all of the cast iron pipe used for underground gas mains was bell-and-spigot pipe—and some of those mains, in use today, have been in continuous service for more than 100 years.

Fifteen years ago, members of the Cast Iron Pipe Research Association developed a new joint to meet changing operating conditions due to higher pressures and the use of drier gas. This new joint, called a "mechanical joint", was an adaptation of the stuffing-box, the invention which made possible the Age of Steam. It was tested by the A. G. A. Laboratory and proved bottle-tight. Today, mechanical joint cast iron pipe is giving satisfactory service under all operating conditions in almost every state in the Union. It is readily available from any of our members.

For further information, address Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.







IN LABORATORY TESTING of gases every detail of AMERICAN wet test meters from gage glass to water line marker and chromium plated pointer insures not only more precise reading . . . quickly . . . but insures continued accuracy of operation for many years. • Greater facility of adjustment is provided. • The metals and materials employed throughout afford maximum protection against corrosion. • Bulletin AG3 describes the up-to-date features in detail, and gives complete data on capacities and applications of the various sizes. It will be mailed you on request. • These instruments are made by the originators and perfecters of wet test meters in the United States.

2205

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

GENERAL OFFICES • 60 EAST 42nd STREET, NEW YORK 17, N. Y.

DEPENDABILITY PLUS WITH WIZARD PRESSURE PILOTS

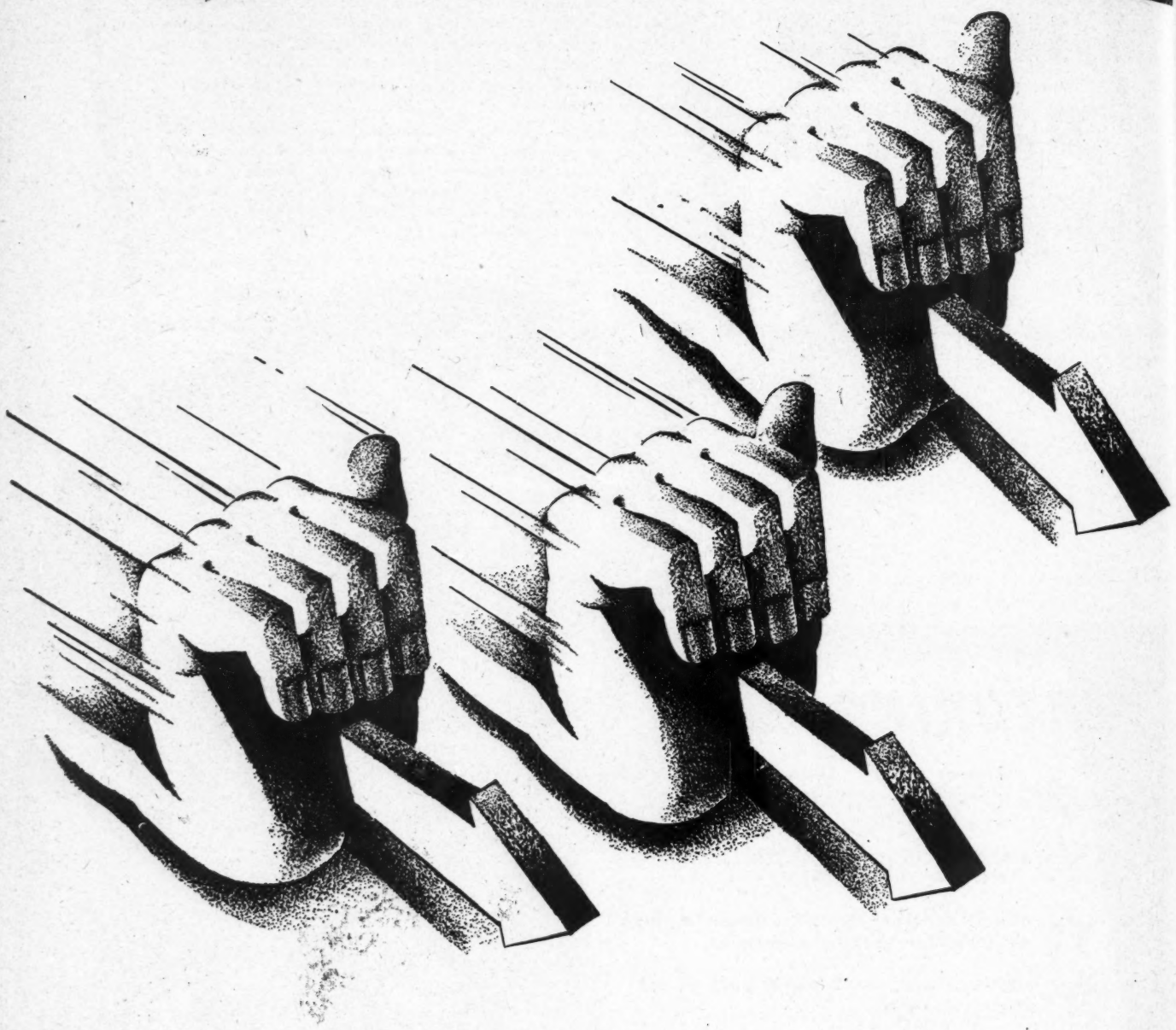
Fisher's Wizard Pilots are simple in design yet extremely accurate and dependable — use no relays or other multiplying devices. Maintain controlled pressure settings within 1% plus or minus. The pilot unit forms an integral part of the control valve providing a close connection between pilot and main valve — an exceptionally dependable compact controller for indoor or outdoor installation.

Wizard Pilots, direct or reverse acting, are available on all standard or high lift Fisher diaphragm valves. Bourdon tube, of bronze or steel for various controlled pressure ranges, expertly selected to meet the exact operating conditions specified. Fisher guarantees satisfactory performance for each and every Wizard controller. Write for Bulletin D.

ATURING

1. Thumb screw adjustment of throttling range — 1% to 75% of tube range.
2. Vernier screw adjustment for setting controlled pressure.
3. Highly sensitive Bourdon tube of bronze or steel for various pressures.
4. Pilot assembly an integral part of diaphragm casing.
5. Weather proof mounting for gauges — indicate operating medium pressure and pressure on the diaphragm.
6. Auxiliary operating medium regulator standard equipment.
7. Controlled pressure connection with auxiliary tapping for gauge mounting.

THREE NEW PARTNERS . . . GOING



TERMINAL TOWER
CLEVELAND, OHIO

AHEAD WITH DRESSER

DRESSER INDUSTRIES now number ten.

Formerly, we were seven companies helping to bring basic services to the user more efficiently.

Our three new partners, each a specialist in its fields, both round out and broaden Dresser's scope of usefulness. This larger Dresser group can now serve industry and consumers with more products and greater experience.

The new Dresser members are bulwarked by an organization that assures their customers continued progress in product improvement, greater wherewithal for pioneering research and steady maintenance of service.

Dresser Industries, Inc., has progressed through the management principle of giving to alert, independent know-how an adequate backing and pooled resources. From these, each member draws teamed strength far greater than it could enjoy alone. The three new members of Dresser Industries, Inc., increase opportunities for mutual aid among the teammates, and at the same time, draw from the group advantages for those they serve.

MEMBER COMPANIES

Dresser Manufacturing Division
Bradford, Pa.

The Bryant Heater Co.
Cleveland, Ohio

Clark Bros. Co., Inc.
Olean, N. Y.

Pacific Pumps, Inc.
Huntington Park, Calif.

Bovaird & Seyfang Mfg. Co.
Bradford, Pa.

Dresser Mfg. Co., Ltd.
Toronto, Ont.

Van der Horst Corp. of America
Olean, N. Y. Cleveland, Ohio

PLUS

*International Derrick & Equipment Co.
Columbus and Marietta, Ohio
Torrance, Calif. Beaumont, Texas

*Roots-Connersville Blower Corp.
Connersville, Ind.

*Stacey Bros. Gas. Construction Co.
Cincinnati, Ohio

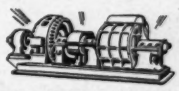
DRESSER Pipe couplings and repair devices for pipeline systems. Rings and forgings.

BRYANT Gas-fired boilers, winter air conditioners, furnaces, unit heaters and conversion burners for residential, commercial and industrial heating.

CLARK Engines and compressors for oil production and refining. Marine and stationary Diesel engines.

PACIFIC Hot-oil charging pumps; boiler-feed pumps; general-service pumps for the petroleum and other industries; oilwell plunger pumps; deep-well turbine pumps.

INTERNATIONAL DERRICK Oilwell pumping units, derricks and masts, drawworks, rotary tables and drilling units. Airport, communications and electric-power-line equipment and prefabricated steel buildings.



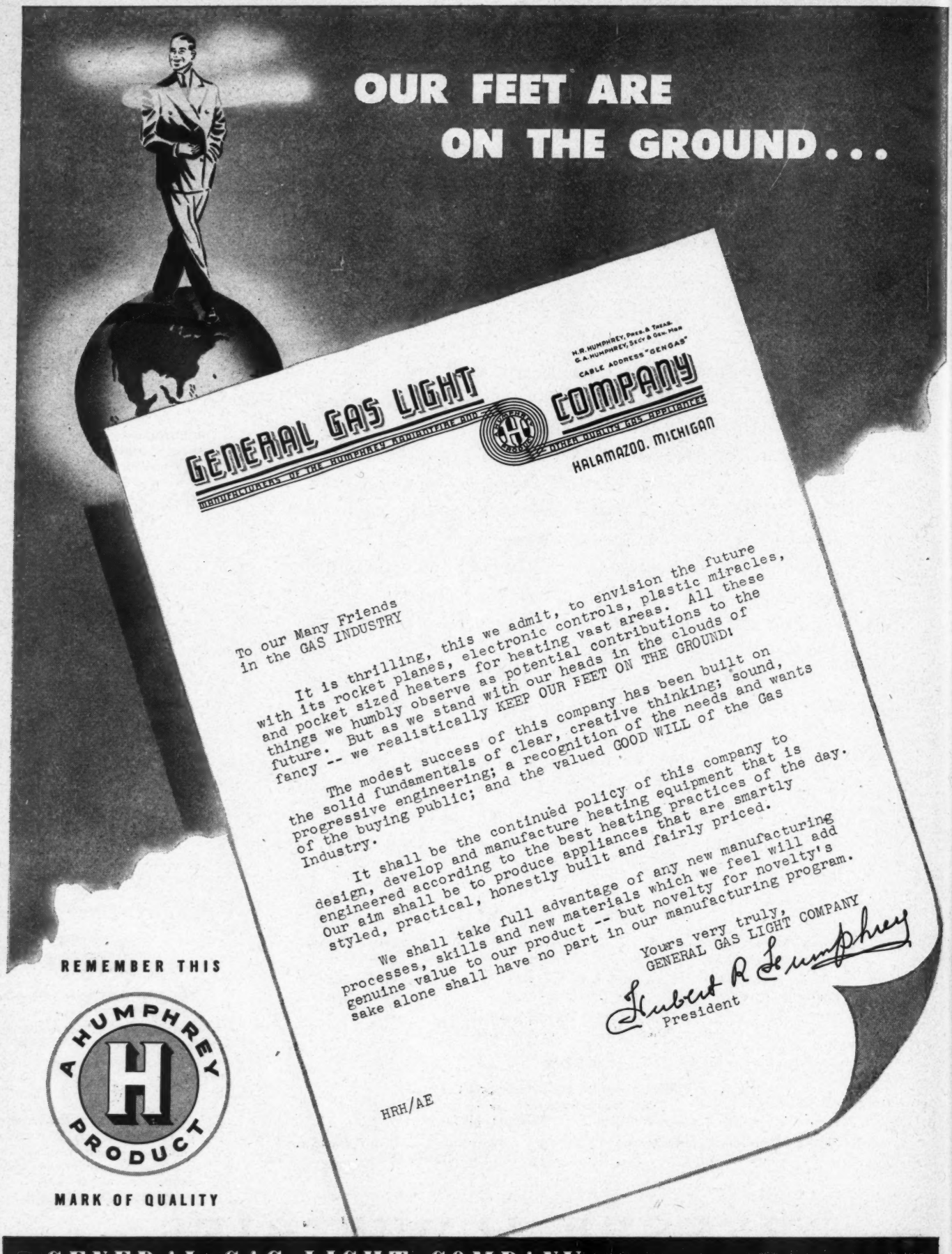
ROOTS-CONNERSVILLE Positive displacement and centrifugal blowers, exhausters, boosters and compressors. Air and liquid pumps and meters.

STACEY BROS. Storage holders, tanks and pressure vessels for the gas, oil, chemical and food industries.

BOVAIRD & SEYFANG Pumping engines, jacks, "powers", storage tanks and allied supplies and equipment for oilfields.

VAN DER HORST PORUS-KROME—a patented process of applying chromium lining on cylinder walls, piston rings and crankshafts—for longer wear.

DRESSER INDUSTRIES
INCORPORATED


OUR FEET ARE
ON THE GROUND...
GENERAL GAS LIGHT COMPANY
H. R. HUMPHREY, Pres. & Treas.
G. A. HUMPHREY, Secy & Gen. Mgr.
CABLE ADDRESS "GENGAS"
MANUFACTURERS OF THE HUMPHREY AUTOMATIC AND
OTHER QUALITY GAS APPLIANCES
KALAMAZOO, MICHIGAN
To our Many Friends
in the GAS INDUSTRY
It is thrilling, this we admit, to envision the future with its rocket planes, electronic controls, plastic miracles, and pocket sized heaters for heating vast areas. All these things we humbly observe as potential contributions to the future. But as we stand with our heads in the clouds of fancy -- we realistically KEEP OUR FEET ON THE GROUND!
The modest success of this company has been built on the solid fundamentals of clear, creative thinking; sound, progressive engineering; a recognition of the needs and wants of the buying public; and the valued GOOD WILL of the Gas Industry.
It shall be the continued policy of this company to design, develop and manufacture heating equipment that is engineered according to the best heating practices of the day. Our aim shall be to produce appliances that are smartly styled, practical, honestly built and fairly priced.
We shall take full advantage of any new manufacturing processes, skills and new materials which we feel will add genuine value to our product -- but novelty for novelty's sake alone shall have no part in our manufacturing program.
Yours very truly,
GENERAL GAS LIGHT COMPANY
Hubert R. Humphrey
President
HRH/AE
REMEMBER THIS
A HUMPHREY PRODUCT
MARK OF QUALITY

GENERAL GAS LIGHT COMPANY KALAMAZOO, MICHIGAN

23 Warren St., New York City | 2nd Unit Santa Fe Bldg., Dallas | 225 Eleventh St., San Francisco

the future be like . . . and WHY?

DISCUSSION NO. 10

Top burner valves will be standardized

Standardization of parts to achieve greater all-around efficiency is good common sense . . . unless it tends to hinder development. The decision to standardize or not to standardize hinges on these considerations.

In the case of top burner valves, we feel that standardization of certain boundary dimensions and the direction of turn of the stem is justified and highly desirable for the Range of the Future. After all, there is no good reason why some valves should operate clockwise and others counter-clockwise . . . why some valves should be above the manifold and others below . . . why valves should be made to a myriad of specifications. On the other hand, there are very good reasons for simplification of this vital key to operation of the range.

Standardization to this extent will benefit the utility, the dealer, and the manufacturer in these ways:

(a) Service will be less costly . . . standard parts will eliminate repeat calls because repairs can be made quickly and properly, without improvising. This in turn will eliminate one source of customer dissatisfaction—will help to keep the housewife convinced that gas is the ideal cooking fuel.

(b) Standardized parts would tend to lower production costs and make for faster delivery of orders, as compared with higher prices and slow delivery of special valves.

We believe that the standardized top burner valve should turn counter-clockwise to open —the standard practice in other fields of application. Other parts of the valve should be standardized, such as the length of the stem, and the distance of the orifice from the center of the valve. The specifications shown in the illustration at the left might well be adapted as a standard for the industry.

HARPER-WYMAN COMPANY

8562 VINCENNES AVENUE
CHICAGO 20, ILLINOIS

ARMY E NAVY

HARPER BURNER SYSTEM

2-burners-in-1

Connelly Iron Sponge

New Grade B Half Chips
Now Available on Pacific Coast

THE higher activity of Connelly Iron Sponge . . . definitely proven in actual plant operation . . . establishes it as the finest purification material on the market. It is manufactured with the inherent ability to absorb greater total amounts of sulphur and eliminate traces longer. The recommendations of Connelly engineers will help you to obtain real dividends in lower production costs and cleaner gas. The adoption of improved methods of handling and control will give you the maximum benefits from this better grade material.

The high quality of the material gives it an unusually long activation period. The result is a definite saving in labor costs . . . a mighty important factor in these days of high wages and man power shortages.

The revivifying properties of this better purification material gives it long life and a continuance of high activity . . . an additional assurance of low operating costs.

Connelly Iron Sponge is used by leading gas companies all over the country. Your plant, too, can benefit by this better purifying material.

Connelly engineers will be glad to make a thorough analysis of your purification needs and submit unbiased recommendations . . . without obligation. Write us today concerning your specific problems.

Connelly IRON SPONGE

CONNELLY IRON SPONGE & GOVERNOR COMPANY

ELIZABETH, N. J. • 3154 S. CALIFORNIA AVE., CHICAGO 8, ILL. • LOS ANGELES, CALIF.

Perfect Blending

Makes captan the Ideal Gas Odorant

captan Advantages

1. GAS-LIKE SMELL
2. AVAILABLE
3. VOLATILE
4. HARMLESS
5. ECONOMICAL
6. EASY TO HANDLE
7. UNIFORM
8. DOESN'T FADE OUT

THE conductor raises his baton . . . the music begins . . . and the hushed audience is thrilled by the perfect blending of the strings, woodwinds, brasses and percussion instruments as they are led by the conductor. The varied tones of all the instruments have been combined to achieve a superb musical rendition—one that far surpasses any effect that could be accomplished with any one instrument alone.

In the production of a gas odorant, perfect blending is important also. Years of searching and testing were necessary to determine which odor-producing compounds and what proportions should be utilized to produce Captan.

As the result of this perfect blending, Captan has an odor that is penetrating, pungent and persistant. Its true gas-like odor persists to the end of the line, it is concentrated for easy handling, it is available in adequate quantities.

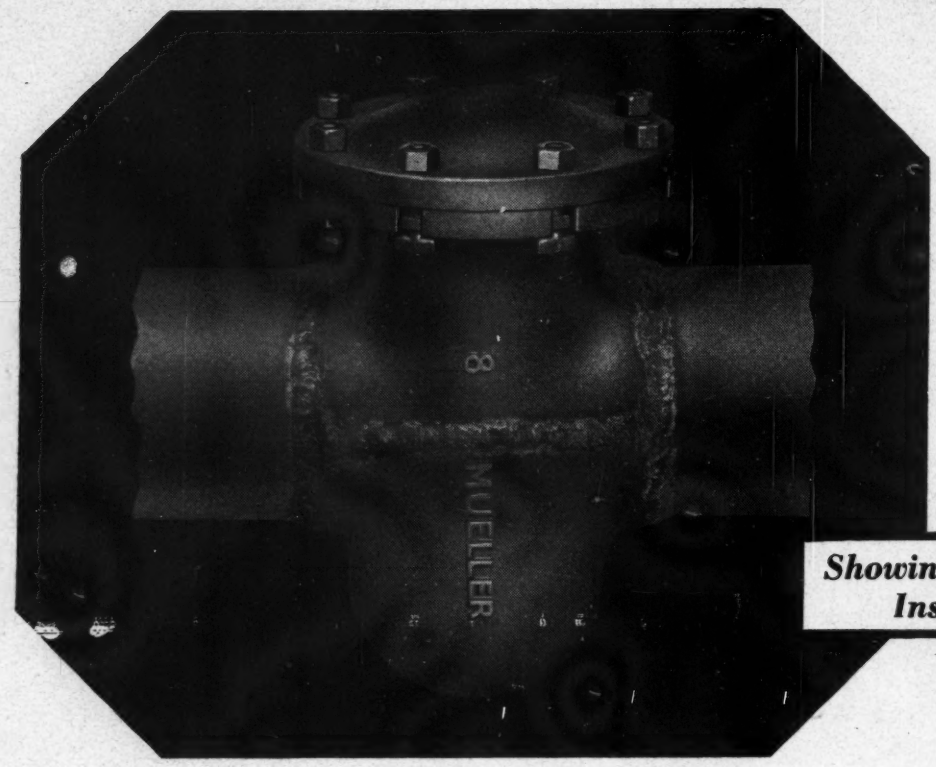
Write for our booklet on "Gas Odorization." If you need advice on your odorizing problems, a trained gas engineer will gladly call at your request.

NATURAL GAS ODORIZING CO.

captan

—the NATURAL Gas Odorant—

LOUISIANA NATIONAL BANK BLDG., BATON ROUGE 2, LOUISIANA
PEOPLES GAS BLDG., CHICAGO 3, ILLINOIS



Showing Completed Installation

DID YOU BUY ANOTHER WAR BOND TODAY?

FOR FAST WORK

H-10422
WELD TYPE FOR STEEL PIPE

H-10424
MECHANICAL JOINT TYPE FOR STEEL OR CAST IRON PIPE

SAFETY NIPPLE

In this gas business trouble has a way of popping up in the most unexpected places. Breaks rarely occur near gate valves, and shut-downs mean expense and delay. In these war times when gas is vitally helping in the ultimate victory, speedy repairs are doubly essential. And when it is speed that you want—rely upon MUELLER Pressure Control Equipment.

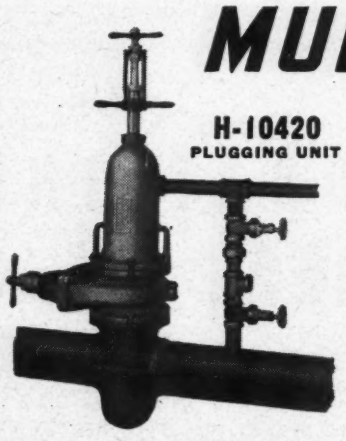
If you have a regular repair job or an emergency, if you want to make lateral extensions, replace old sections of a main, or extend dead-end lines—do it with MUELLER equipment. With MUELLER Pressure Control Fittings you can get a positive shut-off and work in absolute safety without shutting down the line, and do it in much less time than with old-fashioned, expensive, time-consuming methods. Fittings may be installed at the exact spot desired without regard to gate valve locations.

The indispensable "C-1" Drilling Machine shown helps speed your jobs along. Easy to operate. Has automatic or hand feed. Makes cuts from 2" to 12". The air motor makes pipe drilling a pleasure for your men.

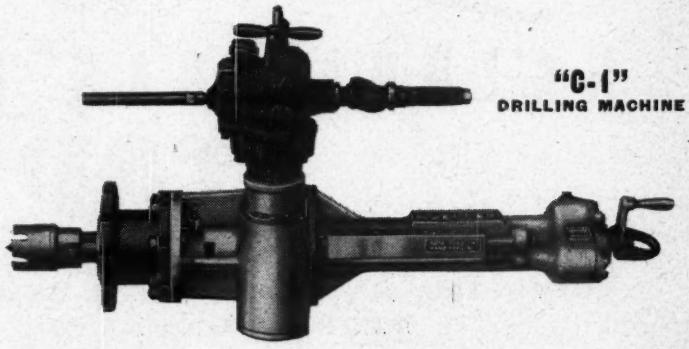
For fast repairs, for saving manpower and money—get MUELLER Pressure Control Equipment now.

MUELLER CO.

DECATUR 70, ILL.
LOS ANGELES 23, CALIF.



H-10420
PLUGGING UNIT



"C-1"
DRILLING MACHINE

hits new high in listening audience!

Nearly 4 million hear story of Gas Appliances every Saturday morning—paving the way for your post-war sales

Here's why:

1. New title: The name of Servel's radio program has been changed to "The Billie Burke Show." Experience shows that people tune in to personalities. In Billie Burke we have a well known and a well loved star. Thus the new title should attract more listeners.

2. New format: We have taken out the service features of the old show as well as local Gas Company cut-ins. These local cut-ins will probably be made a part of the program when Gas Companies again have appliances and equipment to sell.

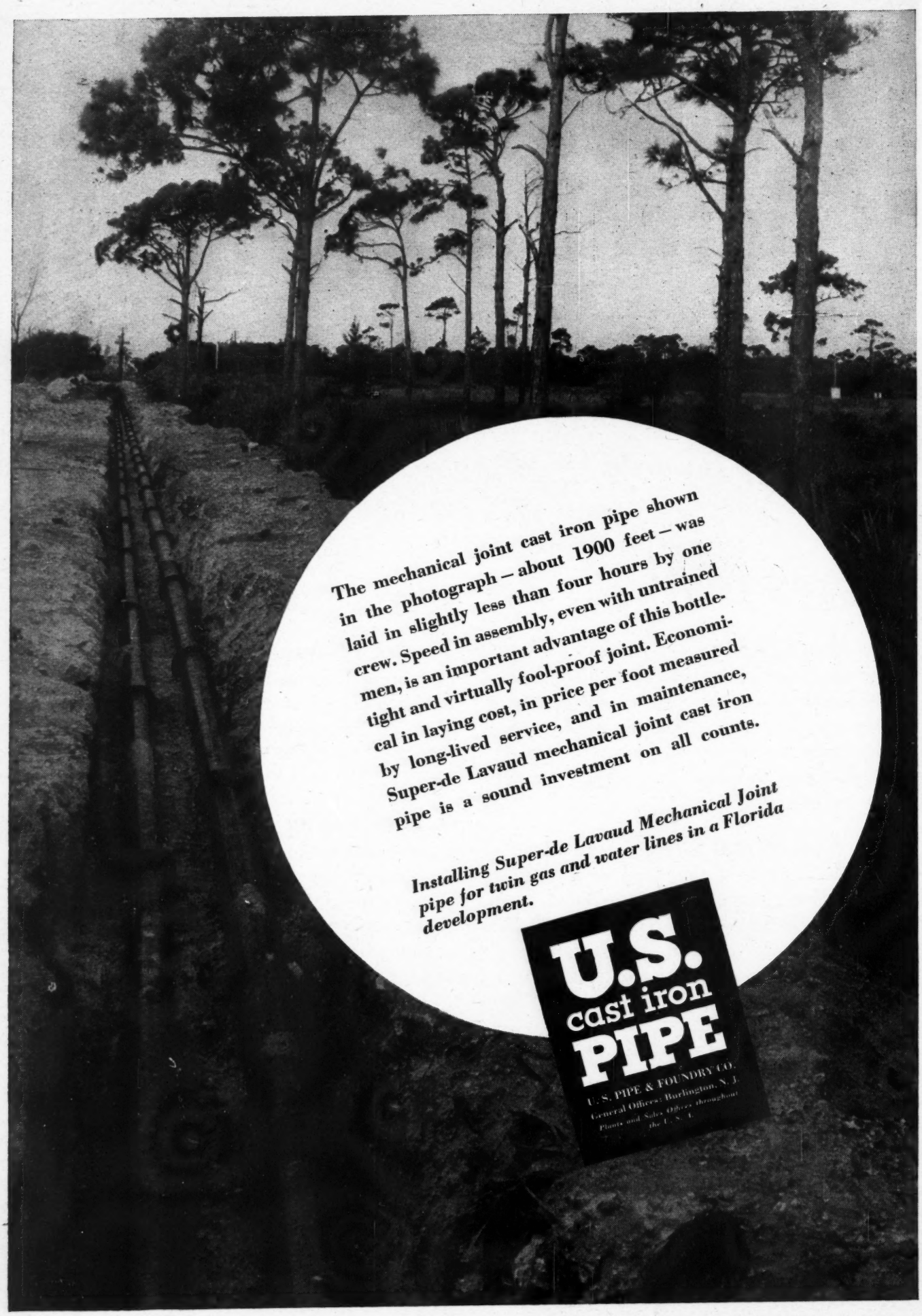
3. More comedy: Each program is built around a comedy situation, with Miss Burke in her usual character of the Merry Mix-up. Continuity of characters in each week's show helps add to the fun and interest.

4. Interesting commercials: The commercials are arranged so that they become part of the show. Studies have shown that commercials which are entertainingly given are liked by the public. Fewer listeners are apt to tune out or close their ears to this type of sponsor information.

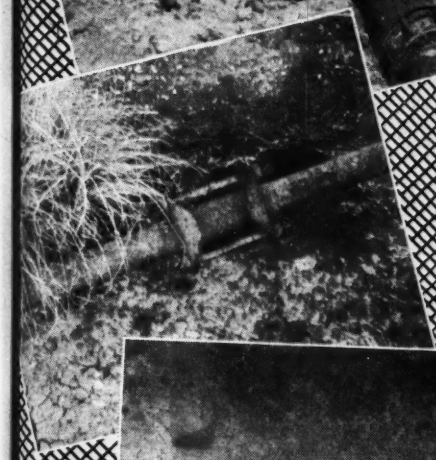
These changes were made because today the public's interest in rationing and other wartime service information is waning. "Fashions in Rations" performed its wartime job well—and the new Billie Burke show will do its job equally well . . . meet today's requirements of publicizing Gas and Gas Service, and build for peacetime needs.

Servel, Inc.

Evansville 20, Indiana


The mechanical joint cast iron pipe shown in the photograph – about 1900 feet – was laid in slightly less than four hours by one crew. Speed in assembly, even with untrained men, is an important advantage of this bottle-tight and virtually fool-proof joint. Economical in laying cost, in price per foot measured by long-lived service, and in maintenance, Super-de Lavaud mechanical joint cast iron pipe is a sound investment on all counts.
Installing Super-de Lavaud Mechanical Joint pipe for twin gas and water lines in a Florida development.
U.S.
cast iron
PIPE
U.S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

DRESSER COUPLINGS Speed Difficult Jobs



BY REDUCING PIPE JOINING TO A SIMPLE MECHANICAL OPERATION THAT ANY WORKMAN CAN PERFORM . . .

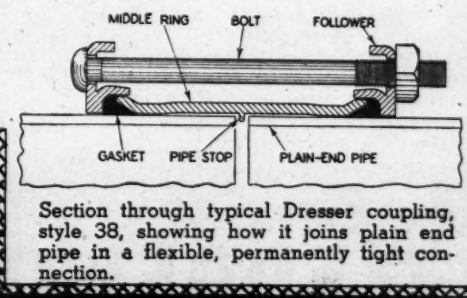
Dressers are flexible and tight, strong and lastin

What are your pipeline problems — exact pipe alignment, corrosion, wet ditch, curves, expansion and contraction, breakage through walls or bulkheads or under tracks, equipment and machinery settings, cramped working space, unaccounted for losses, unskilled labor?

For these conditions and many more, the Dresser line offers a standard coupling or repair device which will readily give the fastest and most practical solution. Strong, accurate, precision-made, Dresser Couplings reduce pipe joining to a simple mechanical operation. Flexible and tight, they serve year after year requiring no costly maintenance.

Over 60 years of specialization in this field lie behind Dresser ability to serve you. Your inquiries are cordially invited for any size, any service, and quantity.

THIS TOOL IS ALL YOU NEED



Section through typical Dresser coupling, style 38, showing how it joins plain end pipe in a flexible, permanently tight connection.

HOUSTON OFFICE AND WAREHOUSE: 1121 ROTHWELL ST., SEC. 16, HOUSTON, TEXAS
IN CANADA: DRESSER MANUFACTURING CO., LTD., TORONTO, ONTARIO

DRESSER MANUFACTURING DIVISION

DRESSER INDUSTRIES, INC.

BRADFORD, PENNSYLVANIA

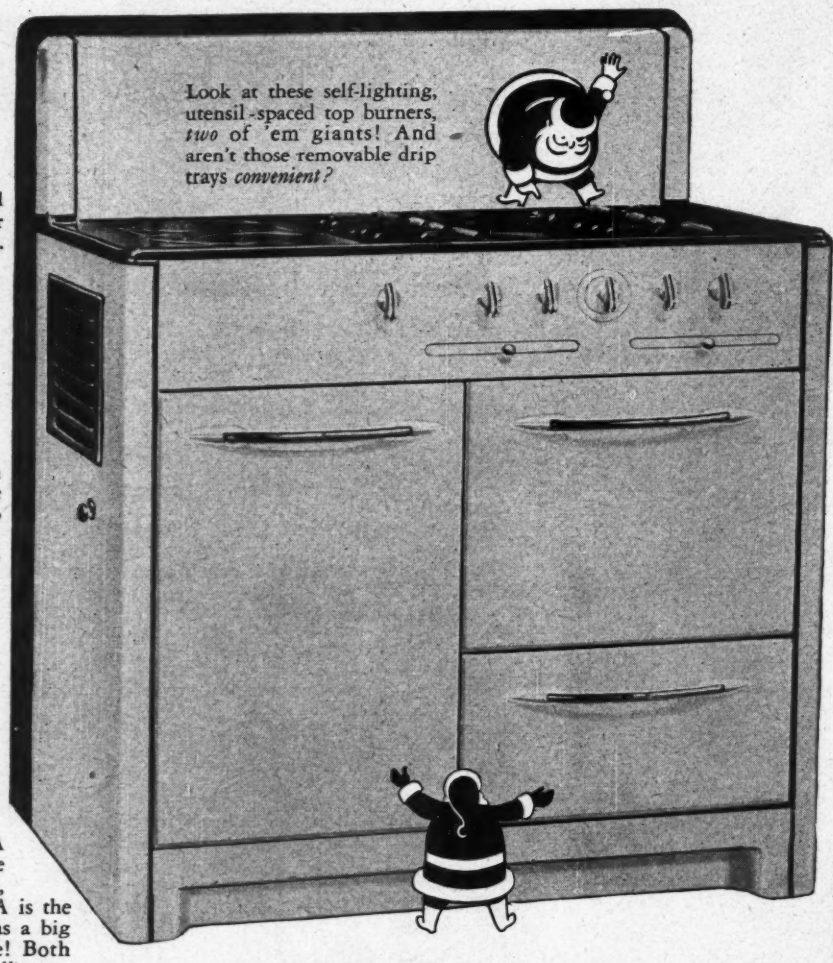
Santa tells why WEDGEWOOD Christmas Dinners taste better!

Year in, year out, war or peace, every western housewife knows that the name WEDGEWOOD on a Gas Range is her guarantee of the same sterling quality James Graham put into the first range he ever built. And today's WEDGEWOOD Gas Ranges have improvements nobody ever *imagined* before. Thousands of WEDGEWOOD users insist that the only way to cook a *real* Christmas dinner is to cook it on a WEDGEWOOD Gas Range. *And they're right!*

That high, all-enamel splash-barrier is handy for setting condiments on.

Many houses are warm and comfortable these winter nights, thanks to this large kitchen heater ... cooks your food and burns your trash, as well.

This range is Model 5023A BK. If you want storage space instead of the heater, Wedgewood Model 5186A is the Gas Range for you: it has a big compartment right here! Both Models are available for all types of gas, including bottled gas.


Look at these self-lighting, utensil-spaced top burners, *two* of 'em giants! And aren't those removable drip trays *convenient?*

It's a full-size standard gas range!

Even, exact baking is simple in WEDGEWOOD's evenly-insulated oven with its precise *oven heat-control*. Has been for over fifty delicious years!

This oven, with its fine stop catch, can't-slip racks, is certainly a lot more practical than old-fashioned ovens!

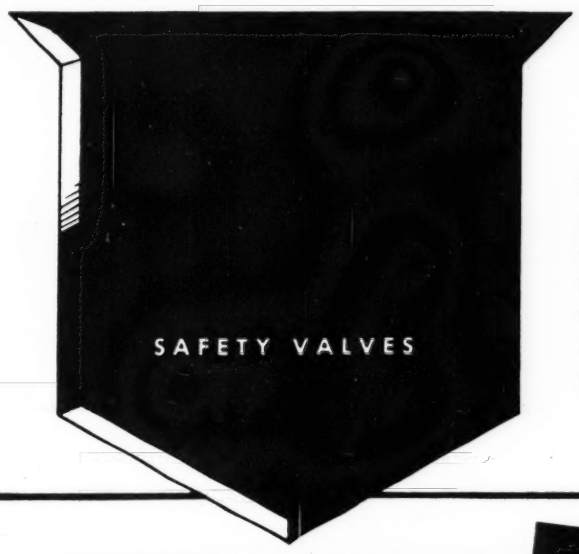
We call this the "easy-to" broiler, because it makes it easy to broil steaks just so; it's the pull out type, has no more smoke than the North Pole!

... and say! WEDGEWOOD certainly makes new friends for GAS

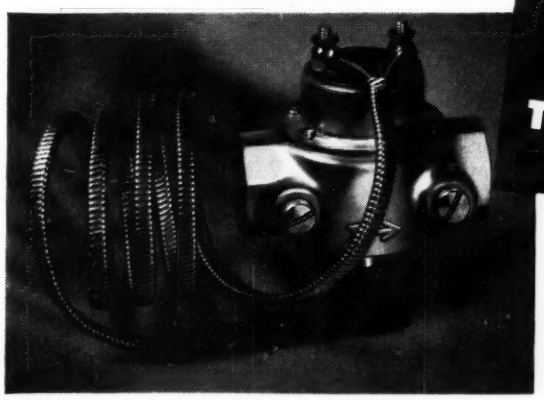
WEDGEWOOD THE MODERN GAS RANGE

JAMES GRAHAM MANUFACTURING CO. • Los Angeles • San Francisco • Newark, Calif. • Portland, Ore.

Newspaper Mats of this advertisement, with WEDGEWOOD signature eliminated, available for dealers.



Years of specialized study have gone into the development of General Controls' complete line of automatic controls for the Gas Industry. The safety-control methods pictured here are outstanding for efficient, dependable performance. Thoroughly field-tested, these methods may suggest applications for insuring positive safety in controlling your gas-fired equipment.

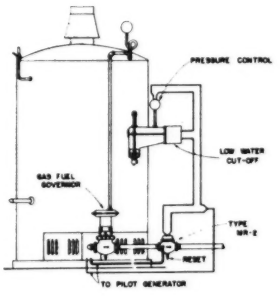


MR-2 Thermovalves

. . . ASSURE UNFAILING SAFETY

. . in domestic and industrial gas control systems. Current for these electromagnetic valves is supplied by pilot generator or thermocouple. Flame failure closes valve until pilot light is re-ignited and valve manually reset. Handles manufactured, natural and liquefied petroleum gases. Used on space and unit heaters; central and floor furnaces; hot water and steam boilers, water and range heaters, commercial ovens, industrial furnaces, and ranges.

WITH FLEXIBLE LEAD CONNECTIONS. Standard Thermocouple length, 30″. Couple enclosed in flame-resistant sheath. Valve sizes, ⅜″ to 1½″ I.P.S.

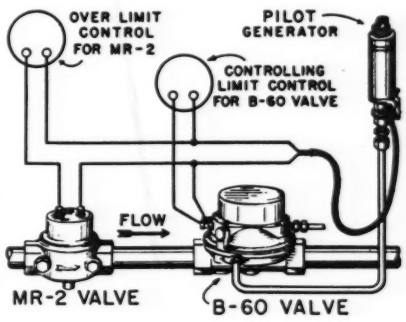


BOILER SAFETY CONTROL

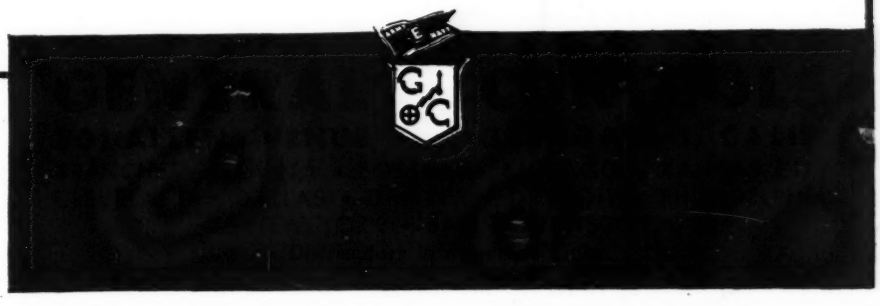
How low water, over-pressure and pilot failure control can be obtained by use of MR-2 and Pilot Generator. This method suggests many other over-limit or safety control applications.

AN EFFECTIVE SAFEGUARD AGAINST TEMPERATURE OVER-RUNS

Diagram at right shows how MR-2 Thermovalve with B-60 Gas Valve insures 100% shut-off, eliminating possibility of temperature over-runs. For example, on a deep fat fryer, the B-60 limit control is set at 380°F; and the MR-2 over-limit control, above 380° but below 410°, the flash point of grease. Should temperature rise over the normal 380°, due to scale or dirt in the B-60 valve seat, the over-limit control will release the MR-2 until operator can attend to heater.



FOR COMPLETE SPECIFICATIONS on safety valves, gas regulators, fuel governors, thermostats and control valves, write for Catalog 52B. Near you is a General Controls' factory branch or distributor equipped to help you fill all your automatic control requirements.



"Better look into this ZONE-CONDITIONING"

Hundreds of inquiries, resulting from our advertising in 30 magazines, are reaching us as well as PAYNE dealers. They reveal the widespread interest in more flexible heating and ventilating for tomorrow's better homes . . . emphasizing the sales opportunity for PAYNE dealers after we complete our war-production job.

Payne ZONE-CONDITIONING

. . . successor to old-fashioned central heating. *Controllable by zones or rooms.* A refinement and improvement of the time-tested PAYNE "unit" system. Provides truly modern heating (with cooling summer ventilation if desired) for large and small homes. ★ ZONE-CONDITIONING models will carry forward the 30-year PAYNE reputation for advanced design, sound construction and carefree performance in gas heating.

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